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A National Environmental/Energy Workforce Assessment. Georgia

National Field Research Center, Inc, Iowa City, Iowa

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A National Environmental/Energy Workforce Assessment

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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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for

GEORGIA

Conducted by:
NATIONAL FIELD RESEARCH CENTER, INC

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
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1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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Finally, appreciation is extended to Mr. B.I. Garland, formerly of the Fulton County Health Department and Mr. Paul Kelman of the Atlanta Regional Commission for their contributions to this report.

PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976-1981) based upon available information for the State of Georgia in the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, waste water, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for Georgia. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air
Noise
Pesticides
Potable Water
Radiation
Wastewater
Energy

National Environmental Energy
Workforce Assessment

Phase I

GEORGIA

State Summary

I. AIR

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources is responsible for the implementation and enforcement of Georgia's Air Quality Control Act. The Fulton County Health Department operates an air pollution control program that works in cooperation with the EPD. The EPD employs 72 persons for air pollution control, while Fulton County employs 14 persons. The Region IV Environmental Protection Agency in Atlanta employs 61 persons for air pollution control.

Professional and technical personnel are employed in the private sector for air pollution control, both in-plant and in consulting firms. The number of air pollution personnel in the private sector appears to nearly equal the number in the public sector.

EPD officials project that five additional persons will be added to the air pollution control staff within the next five years, while the Fulton County staff is expected to decrease to ten. Field research indicates that less than 50 additional personnel will be required for the field for the private sector during the next five years. Region IV EPA staff is expected to increase by two percent annually.

Training needs have previously, in large part, been met by EPA's Air Pollution Training Institute. High tuition rates have recently caused limitations, especially in the public sector, to the number of persons that can participate. Through the development of a regional training committee, personnel in the public sector are forming strategies for filling current training voids.

II. NOISE

Georgia currently has no statewide noise control legislation. Within the Georgia Department of Human Resources, one person currently is employed for noise control activities who answers statewide noise complaints, conducts surveys, and assists municipalities in the development of noise ordinances. According to a recent survey, 29 cities have some kind of noise ordinance. As repeated attempts to facilitate passage of state noise legislation have failed, the approach has been changed to work toward the adoption of Rules and Regulations into the State Health Code. If adopted, five to six additional personnel would be hired for the noise program, and county sanitarians would be utilized (451 sanitarians have been trained in the field).

The Georgia Department of Transportation employs one full-time person for noise control, and additional persons work part-time in the field. Several additional full-time noise analysts may be hired in the next five years.

Also located in Georgia is the U.S. EPA Region IV Office. During 1976, two persons worked full-time in noise. This staff may increase to four or five by 1982.

Results of a survey conducted by the Department of Human Resources indicate that individuals in the state find vehicular noise to be the most distressing. Industrial noise is not currently a serious problem and few industries employ personnel chiefly for environmental noise control. Sources are aware of three consulting firms that offer services in the noise control field.

III. PESTICIDES

The Pesticides Division of the Georgia Department of Agriculture is responsible for the enforcement and implementation of the Georgia Pesticides Control Act and the Pesticide Use and Application Act. The Division, which employs thirteen persons, registers restricted-use pesticides and certifies pesticide applicators. The Entomology Division of the Department enforces the Georgia Structural Pest Control Act, and employs eleven persons for pesticides. The Department's Laboratory Division performs pesticide related analyses, employing nine persons for these purposes. The Structural Pest Control Commission employs two staff personnel.

Thirty-five extension specialists of the Georgia Cooperative Extension Service carry out activities in the field, chiefly training commercial applicators. Two hundred and twenty-two county agents train private applicators on a part-time basis.

Sources estimate that 7,916 certificates will be issued to commercial applicators by October 21, 1977. An estimated 45,000 private applicators will also require certification.

Increased numbers of personnel are not anticipated to be required at the state level during the next five years, and shifts in priorities or changes in activities are not expected to occur. The number of commercial applicators is also not expected to increase dramatically, although an upgrading may occur regarding applicator expertise.

Also located in Georgia is the Region IV Environmental Protection Agency, which employs 19 persons for pesticides. This number may increase to 31 in the next five years.

IV. POTABLE WATER

The Environmental Protection Division of the Georgia Department of Natural Resources implements the state's Water Supply Control Act and employs 34 persons for potable water. This state anticipates assuming primacy for the Federal Safe Drinking Water Act, which would cause significant workforce increases with an estimated additional 61 persons by 1982.

The State operates a mandatory certification program for operators of water treatment plants. As of June 30, 1976, 1,247 certificates were issued to plant operators. Sources estimate that 1,000 additional certified operators will be required because of the construction, expansion and upgrading of plants, coupled with increased enforcement of the certification laws.

The EPD coordinates training for water treatment plant operators. Three types of training are being carried out: a) the Georgia Water and Wastewater Institute, b) Coupled On-The-Job Training Program and c) Spring and Fall Short Course Schools. Officials estimate that 800 persons receive training each year in these three programs. It is estimated that 1,000 operators will require training each year to meet demands. The agency may be able to accommodate this number of students if federal funding is not ceased.

The U.S. Environmental Protection Agency, Region IV, employs approximately 16 persons in the field of potable water. This number is expected to increase to 40 by 1982, to maintain and expand existing programs and for the development of the Underground Injection Control Program.

V. RADIATION

Radiation control functions in Georgia take place in the Department of Natural Resources and in the Department of Human Resources. The former agency conducts such activities as environmental monitoring and emergency response planning, and employs three persons full-time for radiation. Approximately 30 field personnel are utilized as needed. With regard to environmental radiation, the latter agency controls the discharge of radiation into waterways by hospitals and medical laboratories. EPA Region IV Offices are located in Georgia. Currently within these public agencies a total of twelve persons working full-time in the field of environmental radiation control. This number is expected to double within five years, with chief demands being for health physicists, nuclear engineers and technicians. The Department of Human Resources will also train approximately 10 engineers in local health agencies to perform radiation-related duties.

In the private sector, an estimated fifteen to twenty persons currently service the field, both within Georgia Power Company, and in medical facilities. This may increase by approximately fifteen within five years due to the addition of nuclear generating plants and an increased usage of radioactive drugs.

Within the state as a whole, demands will be greatest for health physicists, followed closely by nuclear engineers and technicians. While upgrade training programs are becoming increasingly available, especially for regulatory personnel, curricula in colleges, universities and vocational schools are not currently supplying the numbers of trained personnel required in the state.

VI. SOLID WASTE

The Georgia Solid Waste Management Act gives responsibility for regulating solid waste management to the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources. Enforcement is carried out through a permit system, and all cities and counties are required to prepare long-range solid waste management plans.

The EPD will also be responsible for implementing the Federal Resource Conservation and Recovery Act of 1976. While 36 personnel are currently involved in solid waste in the EPD, this number is expected to increase to over 60 within five years as a result. The Region IV Environmental Protection Agency in Atlanta also expects to increase its solid waste staffing level from five to thirty for implementing the new Act.

There are an estimated 600-620 persons in the state engaged in solid waste disposal, most of whom are landfill operators. This number is expected to remain constant, although shifts will occur whereby one will see a need for more personnel with expertise in the areas of resource recovery and hazardous waste management. The agency cooperates with educational institutions in offering courses in solid waste management.

Career opportunities should increase in the public and private sectors chiefly for engineers and scientists, as well as for trained equipment operators. The state agency has difficulty hiring persons with training or experience in the field, since few educational opportunities are available. This lack may be felt more acutely in the future as the field becomes increasingly technical.

VII. WASTEWATER

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources implements the Georgia Water Quality Control Act. A total of 107 persons in the EPD work in water pollution control, chiefly engineers and scientists. Administrators project that this number may increase to 152 by 1982.

The EPD implements a mandatory certification program for operators of wastewater treatment plants. As of June 30, 1976, there were 1,247 active certificates issued to operators of waste treatment facilities. Officials project that 1,000 additional certified operators will be required within the next five years, and the skill level may demonstrate an upward shift.

The Environmental Protection Agency, Region IV, employs approximately 248 persons in wastewater within the state. Personnel increases are expected, with a projected increase of 57 by 1982, not including clerical, trainee and temporary employees.

Training plant operators is coordinated by the EPD. There are three programs available: Georgia Water and Wastewater Institute, Coupled On-The-Job Training Program, and Spring and Fall Short Course School. Approximately 800 operators are trained each year, and an estimated 1,000 will require training annually. The state may be able to accommodate this many students if federal funding continues.

Career potentials appear to be good for civil and sanitary engineers at the regulatory level, as well as for scientists and technicians. Certified wastewater treatment plant operators of all levels should also be in demand.

VIII. ENERGY

Recently, the Office of Energy Resources was created in Georgia which coordinates energy-related activities in the state, and develops plans for energy conservation and efficiency and emergency response. This Office currently has a twelve-member staff. Other agencies/institutions in Georgia that have involvement in the energy field include: The State Economic Opportunity Office, the Office of Planning and Budget, the Institute of Ecology and the Office of Energy Research at the University of Georgia, the Engineering Experiment Station of Georgia Institute of Technology, the Atlanta Regional Commission and the Southwest Georgia Area Planning and Development Commission. Also located in Georgia are various federal agencies that have energy concerns which include the Federal Energy Administration, the Nuclear Regulatory Commission and the Energy Research and Develop Administration. Based upon interviews with officials located in the above-mentioned agencies, it is estimated that approximately 500 persons in Georgia are involved to some degree in energy conversion/conservation activities.

Future workforce levels in the public sector are in large part dependent upon federal policies and funding levels. It appears probable that the overall workforce will not decrease, although specific projections are unavailable. In the private sector, state sources project increasing numbers of architects, engineers and real estate people that will seek to develop demonstration projects through the Department of Housing and Urban Development.

STATE OF GEORGIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	287	295	311	322	333	343	4%
NOISE [2]	4					15	n/a
PESTICIDES [3]	318	324	330	336	342	349	2%
POTABLE WATER [4]	1,297	1,539	1,752	1,965	2,176	2,382	13%
RADIATION [5]	60	68	76	84	92	100	11%
SOLID WASTE [6]	651	664	684	696	701	704	2%
WASTEWATER [7]	1,540	1,763	1,986	2,209	2,434	2,642	11%
ENERGY [8]	500	500	500	500	500	500	0
TOTALS	4,657	5,153	5,639	6,112	6,578	7,035	9%

[1] Includes personnel in the public and private sectors, but does not include possible implications of an auto emissions program currently being developed.

[2] Includes full-time personnel in the public sector. Not included are 451 sanitarians who have been trained in noise control, part-time personnel in the Department of Transportation, or personnel in the private sector, for which figures are unavailable.

[3] Includes federal, state and county personnel and does not include an estimated 7,916 commerical and 45,000 private applicators to be certified by October 21, 1977

[4] Includes EPA and state personnel and certified water treatment plant operators.

[5] Includes full- and part-time personnel in EPA, state and local agencies, the power industry and medical facilities.

[6] Includes the state agency, RPA and an estimated 610 persons in disposal, for which no growth is expected.

[7] Includes EPA, the state agency certified wastewater treatment plant operators.

[8] The 1976 figure is an estimate which includes federal, state and local agencies/ institutions with energy-related concerns. No specific projections are available, but appears that the total number will not decline, but may increase.

EDUCATION

In Georgia there are several educational institutions that provide environmental curricula which prepare students for employment in a number of environmental fields.

The Georgia Institute of Technology offers a variety of programs including: 1) Acoustical, 2) Energy, 3) Chemical, 4) Civil, 5) Mechanical, and 6) Nuclear Engineering on the B.S., M.S. and Ph.D. levels. Southern Technical Institute offers A.S. and B.S. degrees in Civil Engineering as well as an A.S. degree in Electrical Engineering with a Nuclear Safety Option.

West Georgia College offers a non-degreed Community Education program with an emphasis on environmental technology that familiarizes students in Wastewater, Surface and Ground Water Treatment, and further water study through on-the-job training.

Georgia Military College in Milledgeville offers an A.S. degree in Engineering with an optional concentration in Environmental Health.

The College of Agriculture at the University of Georgia offers an environmental health science curriculum as well as a concentration in pest management. Georgia College awards A.S., B.S., and M.S. degrees in Environmental Science in which students may specialize in water quality, air quality or a mixture of both areas. Middle Georgia College offers an A.S. degree curriculum in Environmental Technology.

LEGISLATION

The environmental/energy legislation for Georgia was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Quality Control Act

Vehicular Visible Emission Control Act

Pesticide Use and Application Act

Economic Poisons Act

Water Supply Quality Control Act

Groundwater Use Act

Radiation Control Act

Solid Waste Management Act

Certification of Water and Waste Water
Treatment Plant Operators Act

Water Quality Control Act

Surface Mining Act

Council for Energy Resources Act

National Environmental Energy
Workforce Assessment

Phase I

GEORGIA

State Report

13

STATE PROFILE

Georgia is located in the Southeast United States, and is the largest state east of the Mississippi River. With its 58,876 square miles, Georgia is the 21st largest state in the United States. Georgia's population in 1970 was 4,589,575, of which approximately 57 percent lived in metropolitan areas.

The State contains 100 miles of coastline to the southeast, and also contains the Okefenokee Swamp, one of the largest in the U.S., totaling 660 square miles. To the north, Georgia contains rolling mountainous areas, which gradually form flatter fertile terrains to the south. The average annual temperature in the State is 61 degrees, while annual precipitation averages 47 inches.

Georgia contains two cities of over 250,000 population: Atlanta and Augusta. Atlanta is the communication and transportation center of the Southeast, and the chief distributor of goods. Other metropolitan areas include Columbus, Macon, Savannah and Albany. The State's population has exhibited a trend from the rural to the urban, mirroring the shift from an agricultural- to an industrial-based economy. Industrialization is increasing, and the value of factory products has exceeded the value of farm products.

Significant amounts of agricultural activity still occur within the State, and important commodities include peanuts, eggs, corn, pecans, rye, tobacco, cotton and soybeans. The State is also a chief producer of hogs and chickens. There are large deposits of marble in several portions of Georgia, and other marketable natural resources include clay, bauxite, zirconium and kyanite. The State's vast pine resources provide significant amounts of resins, turpentine and pulpwood.

Georgia has been a leader in the production of paper and board, tufted textile products and processed chicken. Other manufactured products include transportation equipment, food products, apparel and chemicals.

In 1976, about $850 million was invested in new or expanded manufacturing facilities in Georgia, a State record. This, along with several legislative events expected to facilitate industrial expansion, should create employment opportunities that will bring down the State's high unemployment rate, according to researchers. Although there were 66,000 more people working in Georgia during 1976, bringing the total civilian workforce to 2,014,000, the percentage of jobless was 7.1 percent. This was down from the 9.5 percent in 1975, but higher than the 3.9 percent in 1973 and the 5.0 percent in 1974. Still, it was below the national average, which was 7.7 percent in 1977.

The State's economy grew at a 12.3 percent rate in 1976, as measured in gross state product (GSP), according to University of Georgia's Division of Research. This was above the 11.6 percent gain in U.S. gross national product (GNP). According to officials of this research unit, Georgia's GSP may increase another 14 percent in 1977, comparing favorably with the expected national rate of 11.7 percent. Forecasted is a total growth in employment just under 4 percent to 2.09 million people in 1977, and it is hoped that the statewide unemployment rate will drop below 6 percent for an annual average of 5.7 percent. Total personal income is expected to increase by 13 percent during 1977, due in part to a higher level of employment. Researchers warn that improvements may not continue through 1978, although economic stimulations from the federal level could avert the strong downturn anticipated for that year.

GEORGIA POLLUTION CONTROL AND ABATEMENT AGENCIES

The Georgia Department of Natural Resources is the principal state environmental agency. This Department has primary responsibility for the air, potable water, solid waste and waste water programs, and for a major portion of the environmental radiation program. Additional state agencies or organizations concerned with environmental protection include the Department of Human Resources, the Department of Agriculture, the Cooperative Extension Service, and the Office of Energy Resources.

In the Department of Natural Resources, the pollution control activities are located in the Environmental Protection Division (EPD). This Division has four branches, the Air Protection Branch, the Land Protection Branch, the Water Protection Branch and the Program Coordination Branch.

The first Branch is responsible for the assurance and maintenance of the air quality in Georgia. A permitting process is utilized for enforcement of the State legislation, technical assistance to the private sector is provided, and air monitoring is performed. In addition, this Branch administers the State Air Implementation Plan developed under the mandates of the Federal Clean Air Act.

The Land Protection Branch is responsible for the implementation and administration of the statewide regulatory program in solid waste management. Hazardous waste management, development of resource conservation and recovery planning methods and assurance of proper land disposal methods are priority activities of this Branch. Also operated within the Land Protection Branch is a surface mined land recovery program.

The Water Protection Branch of the Environmental Protection Division is responsible for the State's potable water and wastewater programs, and carries out a water and wastewater treatment plant operator training program. This Branch will attempt to assume primary enforcement responsibility of the Federal Safe Drinking Water Act. Wastewater pollution control activities are primarily carried out in the Branch through NPDES permitting and planning as specified in the Federal Water Pollution Control Act. This Branch also regulates consumptive uses of groundwater.

The Program Coordination Branch of the EPD supports the air, solid waste, and water programs through its regional offices and through its analytical laboratories. This Branch also houses the Division's Environmental Radiation Program, which performs environmental radiation monitoring and develops contingency and activity plans.

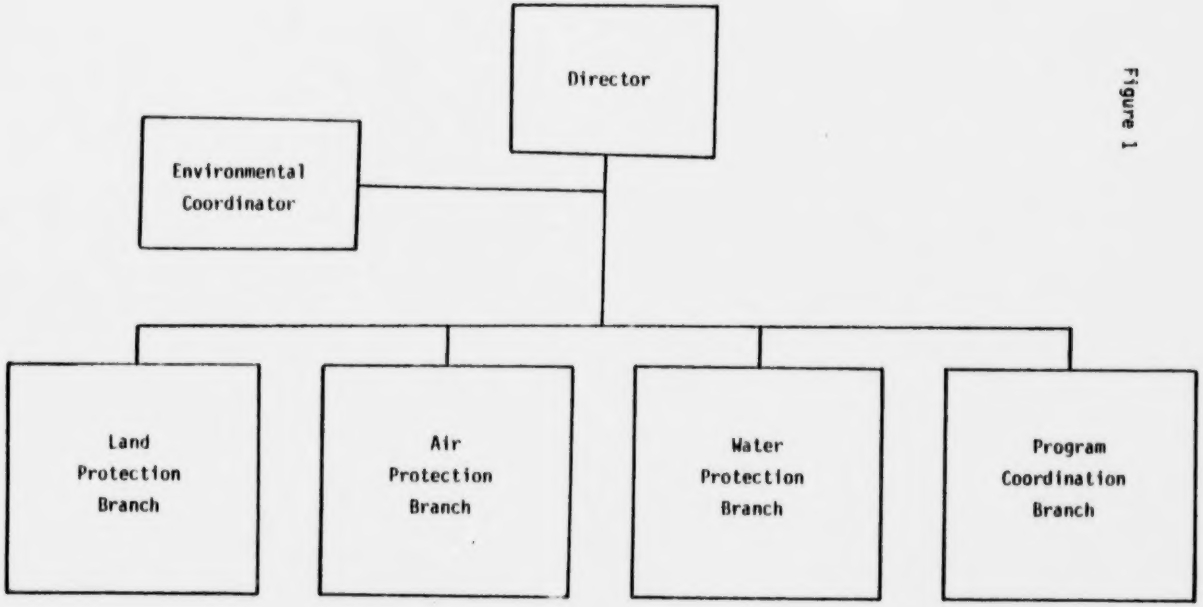
The Radiological Health Unit of the Georgia Department of Human Resources has a radioisotope program that performs inspections of hospitals and laboratories to determine the amount of radioactive materials being used, the amount put into patients, and the amount discharged into the State's rivers. Also in the Department of Human Resources in the Special Operations Unit is one staff person who answers statewide noise complaints, performs surveys, provides technical assistance and encourages the passage of State environmental noise legislation or the adoption of Rules and Regulations in the State Health Code.

The Pesticides Division of the Georgia Department of Agriculture is responsible for certifying all private and commercial pesticide applicators and dealers. Registration of restricted-use pesticides also takes place in the Division. The Entomology Division of the Department of Agriculture administers the statewide program for enforcement in structural pest control. The Laboratory Division of the Department contains two laboratories that perform pesticide-related analyses. Extension Specialists from the Cooperative Extension Service conduct applicator training for all commercial applicators, while county agents provide training for private applicators.

In 1976, the Office of Energy Resources was created within the State Office of Planning and Budget. This Office has been assigned various functions, including the preparation of a standby emergency fuel shortage plan, the design and implementation of a program to promote energy conservation and efficiency in the State, and the soliciting of funds for purposes relating to energy conservation and efficiency.

Figure 1

GEORGIA ENVIRONMENTAL PROTECTION DIVISION


Director
Environmental Coordinator
Land Protection Branch
Air Protection Branch
Water Protection Branch
Program Coordination Branch

Pollution Control and Abatement Programs

I. AIR

A. Introduction

In 1967, Georgia's Air Quality Control Act was passed by the State Legislature, and administration and enforcement of the Act was charged to the Department of Public Health. As a result of the Executive Reorganization Act of 1972, all functions related to air quality control were transferred to the Department of Natural Resources, and implemented through its Environmental Protection Division (EPD).

According to Assistant Attorney General Robert Bomar, by the early 1970's the State air quality program was becoming fully functional and active, and Georgia was one of the first southeastern states to become federally approved under the Federal Clean Air Act. Georgia was also one of the first states in the nation to obtain federal approval for implementation of new hazardous source compliance standards. Enforcement of Georgia's regulations is carried out through a permitting process. The Environmental Protection Division is responsible for granting, denying, revoking or amending all permits or variances provided for in the law, and the Attorney General's office handles litigation involving the prosecution of offenders of the law.

Although the Environmental Protection Divison is the lead agency for implementation of the state's air quality control program, the Fulton County Health Department operates a federally and county-funded air pollution program that works in close cooperation with the EPD. The county has developed its own regulations, which are similar to the state's, yet somewhat more stringent, mainly with regard to open burning. While this activity is banned under county regulations, the state permits open burning under certain circumstances. Fulton County's program has been in operation for eleven years.

Within both the state and county programs, little workforce growth is expected to occur within the next five years, as few new functions are expected to occur within this time and because of limited budgets. However, the state and county programs, in cooperation with such groups as the Atlanta Regional Commission, the Georgia Department of Transportation, and the Federal Highway Administration, are focusing efforts toward the State's major air pollution problem, which are high ozone and carbon monoxide levels in Atlanta, occurring from transportation sources. Recommendations and regulations will be developed based upon research currently in progress, which may affect future workforce levels at the state level.

Farther into the future, impact of the Federal Toxic Substances Control Act may occur at the state level for air pollution control programs. However, due to the recency of the Act's passage, neither workforce requirements nor specific activities to be required can be predicted. Additional ambient air standards may also be implemented, which would require additional sampling personnel. The speculative nature of this forecast, too, precludes further definition of impact.

B. Workforce Profile

Chief responsibilities for implementation of the air quality control program in the EPD are carried out by the Air Protection Branch, although support is received from the Program Coordination Branch. A principal goal of the program is to enforce all state laws and regulations relating to air pollution control and to satisfy all federal regulations. Functions and activities of the Air Protection Branch include the following:

1) Participating in the development and modification of all necessary laws, rules and regulations.

2) Issuing construction, operating and temporary operating permits to sources for enforcement of regulations.

3) Providing technical guidance and advice to sources as to the requirements of state air regulations and the methods to satisfy them.

4) Conducting periodic inspections of sources for ascertaining compliance.

5) Studying and developing control procedures and equipment that must be understood by staff for adequate permit evaluations, and keeping abreast of new technical developments in the field.

6) Administering the State Air Implementation Plan.

7) Conducting all ambient air sampling and specific source emission sampling as they relate to compliance with emission standards of state and federal laws.

8) Providing advice to industries and local governments in the areas of sampling and analysis of all contaminants covered under state law.

The Air Protection Branch is divided into two main sections: Air Quality Control and Air Quality Evaluation, both operated through the main headquarters in Atlanta. The Program Coordination Branch supports the air quality control program through its four regional offices, three district laboratories, and through its administrative staff and central laboratory in Atlanta. Staff in the regional offices perform inspections and other activities related to enforcement as needed. Air quality analysis is conducted in the laboratories to assure compliance of stack emissions with regulations. Laboratory staff also assist program personnel in the interpretation of lab results, and appear as witnesses in legal proceedings.

The Air Protection Branch itself employs 56 employees, which it categorizes as follows: one branch chief, two section chiefs, two program managers,

Figure 2

GEORGIA ENVIRONMENTAL PROTECTION DIVISION
AIR PROTECTION BRANCH

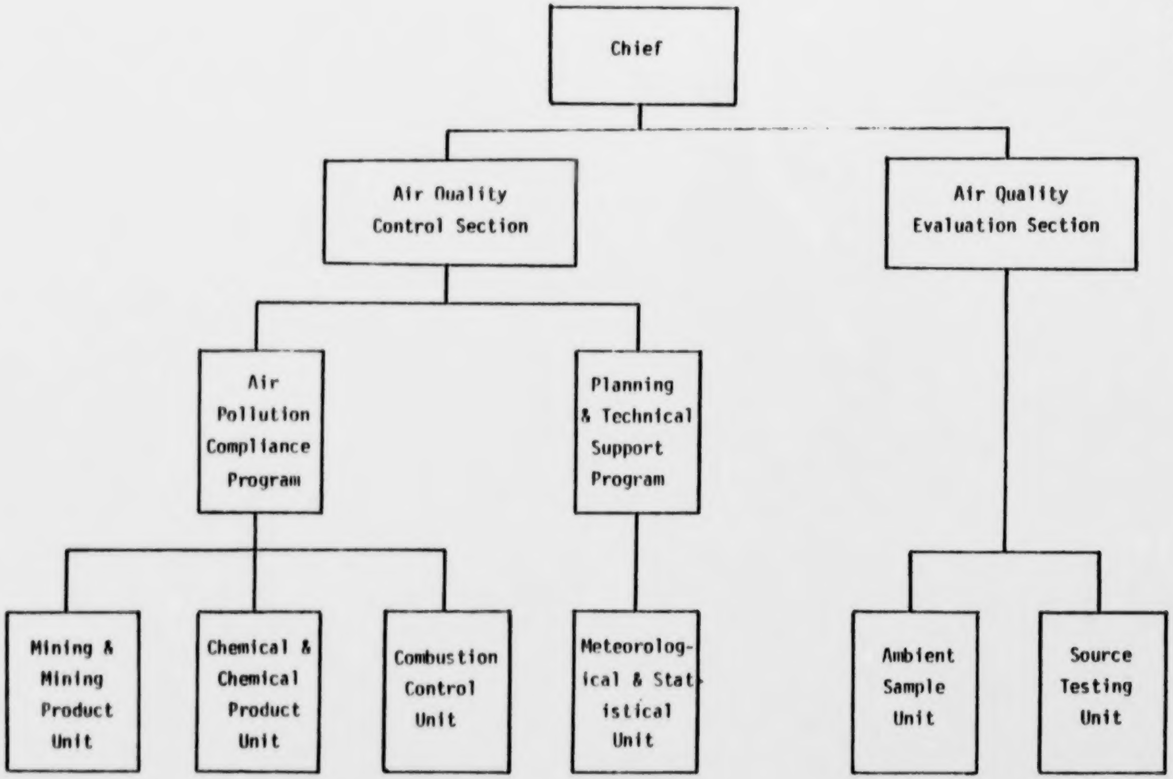
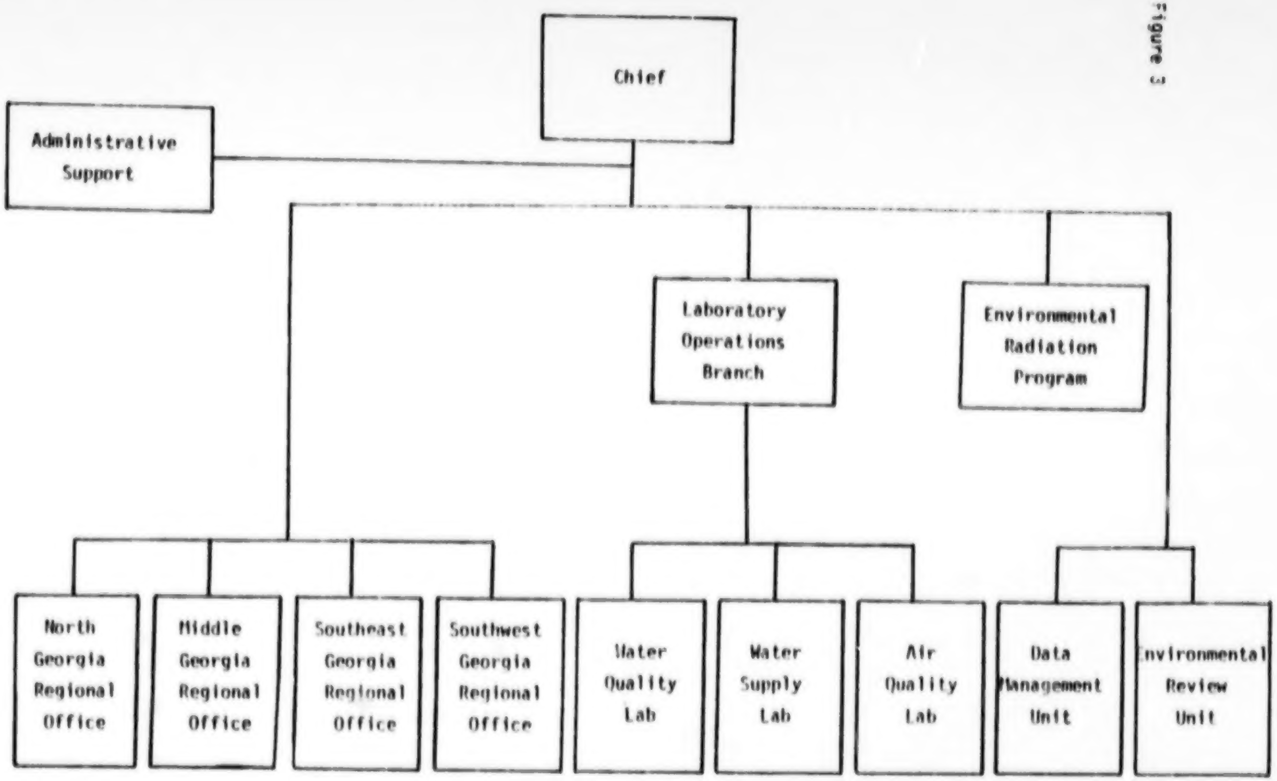

Chief
Air Quality Control Section
Air Quality Evaluation Section
Air Pollution Compliance Program
Planning & Technical Support Program
Mining & Mining Product Unit
Chemical & Chemical Product Unit
Combustion Control Unit
Meteorological & Statistical Unit
Ambient Sample Unit
Source Testing Unit

Figure 3

GEORGIA ENVIRONMENTAL PROTECTION DIVISION
PROGRAM COORDINATION BRANCH


Chief
Administrative Support
Laboratory Operations Branch
Environmental Radiation Program
North Georgia Regional Office
Middle Georgia Regional Office
Southeast Georgia Regional Office
Southwest Georgia Regional Office
Water Quality Lab
Water Supply Lab
Air Quality Lab
Data Management Unit
Environmental Review Unit

two unit coordinators, twenty engineers, twenty-one environmental specialists and eight clerical employees. Similarly, budgeted to air quality control in the Program Coordination Branch are the following: eleven environmental specialists, one technician, three scientists and one engineer. Administrators may have either engineering or natural science backgrounds.

Engineers, scientists and technicians that have had no prior working experience in the field are hired in "training" classifications, and receive close supervision and guidance. An employee's tenure in this classification does not exceed one year, at which time promotion to a higher class occurs. Engineers may advance through levels I through IV, as established by the Georgia Merit System. All must have an engineering degree, although experience and/or educational requirements increase with each successive level. Within air programs chemical engineers are preferred, with second choice being mechanical. Civil, sanitary, aeronautical and ceramic engineers are utilized, however, as the first two groups are difficult to recruit.

The minimum requirements for an environmental scientist is graduation from college with a degree in chemistry, biology, microbiology, or bacteriology. With further experience and/or education, employees may reach the level of IV.

According to the State Merit System, environmental specialists must have degrees in natural or physical science, and promotion may take place to the level III. In air programs, these employees preferably have backgrounds in chemistry or physics. Biologists are utilized, however, because of the great supply, but they must have had chemistry coursework.

Technicians I need only have had high school educations, while those in the II and III classifications require previous experience and/or completion of two academic years of college with at least twenty quarter hours in at least two or more of the following subjects: mathematics, biology, chemistry, physics, or laboratory sciences.

To fill vacant positions, the Branches first rely upon the State Merit System register. The Merit System ranks applicants, and the Branch may choose from among the top five candidates. Branch officials feel this system is weak, as Merit System personnel do not have enough background in pollution control to be able to adequately measure a person's competence in the field. When seeking engineers, there are often fewer than five names on the register. In these cases, Branch administrators make personal contacts and call upon universities and colleges in an effort to get more qualified persons listed.

The following table depicts the total numbers of personnel engaged in air quality control within the Environmental Protection Division:

TABLE I

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Air Pollution Control

Current (1976) Staffing Level

Position	1976
Air Protection Branch	
Engineer	20
Scientist	21
Other[1]	15
Program Coordination Branch	
Engineer	1
Scientist	14
Technician	1
Total	72

[1] Clerical and Administrative

Fulton County's air pollution control program reviews permit applications, evaluates sources for compliance with regulations after permit issuance, and recommends to the sources appropriate courses of action for correcting problems. The permits, however, are issued by the State Environmental Protection Division. Continuous and non-continuous monitoring is also performed by the county for measuring air contaminants, and the related laboratory analysis is performed. The County also develops and releases a daily "Air Pollution Index", or reading of the air based upon suggested federal criteria.

The County's Air Pollution Section is divided into three components: Field Services for enforcement, Technical Services for engineering functions, and Air Monitoring for air sampling and laboratory analysis. Fourteen persons are employed, and job vacancies are filled through the county's own Civil Service Board. Two of the three "technician" positions are filled by degreed personnel, due to the limited job market for graduates in science fields.

The following table depicts the current numbers of persons employed in Fulton County for air pollution control:

TABLE II
FULTON COUNTY HEALTH DEPARTMENT
Air Pollution Section
Current (1976) Staffing Level

Position	1976
Engineer	2
Scientist	8
Technician	3
Other	1
Total	14

During 1976, Georgia contained 303 major installations, or facilities capable of emitting over 100 tons of pollutants each year. This represents approximately 7% of all major installations in Region IV. On June 30, 1976, 281 of these were in compliance with respect to emission limits and/or compliance schedules and 22 were not. According to the director of the Air Protection Branch, Mr. Robert Collom, there are currently a total of approximately 3,000 major and minor stationary sources in the State.

Permits in Georgia are issued to such major industries as steam-electric generation plants, combustion boilers, chemical operations and textile and paper mills. Such industrial operations as kaolin and fullers earth processors, granite quarries, cement manufacturing plants and asphalt mix plants have also required significant efforts to keep air emissions within restricted limitations. Based upon information obtained from administrators within the Environmental Protection Division, and from interviews with persons in the private sector, it appears that few, if any, of the minor sources retain personnel strictly for environmental control purposes. Rather, private consulting firms are often utilized for equipment design and installation, while plant process engineers, scientists, technicians or maintenance personnel are charged with assurance of ongoing operation of equipment as a part of overall job duties. Major installations, too, often retain the services of consulting firms or plant corporate headquarters engineering staffs for equipment design and installation. An unknown percentage employ engineers, scientists or technicians for ongoing maintenance and stack testing. These persons may work in environmental control units within the plants, and often have duties also related to other environmental areas and/or in-plant employee safety. Other major installations pull employees from other non-environmental job duties as needed or employ consulting firm personnel for ongoing operation and maintenance.

Input from the private sector indicates that in general companies would prefer to carry out necessary operations through in-plant procedures. On-staff personnel with general knowledge of chemical processes can often quite easily be trained in the maintenance of pollution control equipment. Process engineers can be utilized when needed for more technical aspects, such as planning. Larger companies recruite through direct advertisement, and often obtain personnel from governmental agencies, due to higher salaries offered within the industrial sector. In-house recruitment is also often utilized.

The Air Protection Branch attempts to keep track of consulting firms in the State that offer services in the field of air pollution control. This task is difficult, at best, because of the increase in numbers that is occuring. However, the Division is aware of nine such firms in the state, all centered within the Atlanta area. These firms offer design, installations, testing and maintenance functions, and while some specialize only in air pollution control, others offer these services as a portion of overall environmental and non-environmental functions.

While estimates are difficult to determine regarding the numbers of persons engaged in air pollution control in the private sector, it appears that the total number might nearly equal the number in this field at the local and state level. In the private sector both professionals and technical personnel are utilized from a variety of sources, both in and out of plants, though in most cases these people service the air pollution field on a part-time basis.

It should be kept in mind also that jobs in the field of air pollution control are also found at U.S. EPA Region IV, located in Atlanta, Georgia. The 1976 level for persons working in this field is approximately 61: 22 engineers, 20 scientists, six technicians and 13 "other"*. The total number of persons working in Georgia full-time in the public sector (federal, state and local) in the field, during 1976 is approximately 147. Based upon findings of this survey, this represents 45 engineers, 63 scientists, ten technicians and 29 "other". It appears then, that the public sector provides greater numbers of opportunities for those seeking careers in air pollution control, perhaps double that of the private sector, based upon available information.

C. Workforce Projections

The Environmental Protection Division requested from the State four new positions for Fiscal Year 1977 for air programs. These positions were to consist of one clerk-typist, one engineer-in-training, one environmental specialist-in-training and one environmental technician II. However, these positions were not granted. Within the next five years, the following positions are projected to be needed by Mr. Collom: one clerk typist for typing reports pertaining to air quality and ambient sampling, three specialists for air sampling, and one engineer for source monitoring functions. The passage of the Federal Toxic Substances Control Act may require additional air program personnel at the state level, but regulations have not yet been released regarding states' roles, and projections are impossible to make at this point.

* For more detail regarding air pollution control activities and staffing levels at this EPA office, the reader should refer to the Region IV report.

The following table depicts future workforce levels for air pollution control.

TABLE III

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Air Pollution Control
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	21	21	22	22	22	22	10%	1%
Scientist	35	35	36	37	38	38	5%	2%
Technician	1	1	1	1	1	1	5%	0%
Other	15	15	16	16	16	16	5%	1%
TOTAL	72	72	75	76	77	77		1%

Turnover rates are higher for engineers because this profession is in demand, and higher salaries are offered by the private sector and the federal government. Scientists and technicians cannot as easily relocate, as the supply of these persons, especially scientists, is currently greater than the demand.

Within the Fulton County Air Pollution Section, a decrease is taking place in personnel due to a cutback in the county budget. The staff will be trimmed to ten, after which time the workforce is projected to be stable indefinitely. The following table depicts projected future workforce levels, as supplied by the unit's acting chief:

TABLE IV

FULTON COUNTY HEALTH DEPARTMENT

Air Pollution Section
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	2	2	2	2	2	2	5%	0%
Scientist	8	5	5	5	5	5	5%	-7%
Technician	3	2	2	2	2	2	5%	-7%
Other	1	1	1	1	1	1	10%	0%
TOTAL	14	10	10	10	10	10		-6%

Turnover is traditionally quite low within this program, except for laboratory technicians. This is attributed to the fact that college graduates are often hired into this position, which offers a low salary, because of the difficulty in finding jobs. However, the job search often continues throughout the employment, and success in finding a higher-paying position often occurs.

As previously mentioned, the state and county agencies, in cooperation with such agencies as the Atlanta Regional Commission, the Georgia Department of Transportation and the Federal Highway Administration, are currently studying the State's greatest single air pollution problem, that of automobile tailpipe ozone and carbon monoxide emissions in the greater Atlanta area. The county program is also concentrating on hydrocarbon emissions from stationary sources. These studies may not require additional workforce levels in the state or local programs. However, an auto inspection and maintenance system may be devised by the agencies for testing tailpipe emissions. It has not yet been determined if the testing will take place in the private sector or by the State. However, regardless of at what level the tests are carried out, a significant number of trained personnel will be required. At the current time, regulations are being developed and tested, and long-range decisions have not been reached.

The above information suggests that dramatic growth within the field of air pollution control is not expected to take place in the public sector unless the State EPD assumes testing responsibilities for auto emissions. As this has not been decided, projections do not take this possibility into account. The workforce level in the State program is expected to grow at an approximate annual rate of 1%, while Fulton County's level is expected to decline by approximately 6%. In addition, EPA Region IV expects to see an approximate annual growth rate of 2%.

As only approximately 7% of all major installations in the State had not yet reached compliance with regulations as of June 30, 1976, it appears that dramatic increases in numbers of professionals in the field will not be required. The numbers involved in maintenance of equipment is expected to remain relatively stable, according to public and private sources. Increases that do occur are expected to result from two factors: the adoption of more stringent regulations and increased industrial development that is occurring in the State. Again, sources indicate that the increase will not exceed 10% annually. Technical and professional types of personnel may increase, but companies appear to be relying to a greater extent upon technical and maintenance type personnel, as activities are shifting towards on-going operation and maintenance. Modifications and adaptations of equipment are often carried out by private consulting firms, the number of which service the field is growing within the State.

The auto emission program to be implemented in the State may affect workforce levels in the private sector if inspection and testing are not carried out by the State. In this case, these activities will probably be carried out by private service stations and garages, such as those that already carry out State vehicle inspections. Extra training to mechanics, however, may be required.

D. Training and Certification

As in the entire Environmental Protection Division, all new non-clerical employees that work in air pollution programs participate in a rotational program for approximately six months, spending time in every program of the Division. At the end of this training period, the new entrants return to the unit into which they were hired. In the Air Protection Branch, all new employees listen to EPA courses from cassette tapes, and read the related manuals. Tests may be taken, and certificates received. Although the participation in this program is not required, it is practiced by all new entrants. In addition to these activities, new entrants are assigned to senior staff persons who in turn provide direct supervision.

Upgrade opportunities for personnel have declined in the past several years, due to the charge of higher tuition rates by EPA and State budget limitations. According to the "Final Cumulative Analysis for Fiscal Year 1976", prepared by Ms. Charlotte Gunter, Registrar of the Air Pollution Training Institute of Research Triangle Park, during FY 1976, 9 persons from the State attended the offered courses.

The Air Protection Branch participates in the Southeastern Air Pollution Training Committee formed through Region IV EPA. Several persons attended the recent course relating to Control of Particulate and Gaseous Emissions in Nashville, Tennessee, in October of 1976 and the Branch plans to send personnel to every course containing subject matter relating to its own needs. The Region IV EPA also sponsors three-day workshops in Athens on air sampling equipment. This is held every two to three years, as needed, and several Branch personnel attend each session.

Higher level administrators in the Branch attend intensive management training offered by the University of Georgia and the State Merit System. Six levels are offered, upon the completion of which persons may become "certified public managers". Lower level personnel attend employee development courses offered by the State Merit System.

The Branch utilizes technical association meetings for upgrade training purposes. Approximately six people per year attend out-of-state meetings, and a higher number attends the less-expensive in-state meetings that are occasionally held.

Usually one person per year from air programs attends graduate school under a 100% stipend program of the EPD. During 1976, nobody was supported under this program, but this situation is expected to change.

Although having attended training definitely is an asset for promotion, advancement in the State EPD is limited by organizational constraints, according to Division personnel. Only a small percentage can advance to high administrative levels.

On-the-job training is also offered to new entrants within the Fulton County Air Pollution Section. For two to four weeks, a supervisor demonstrates procedures and evaluates an employee's competence at performing the same procedures. In the field, supervisors accompany new entrants on inspections and teach procedures, discuss problems that arise and how to handle them.

All professional and technical employees within the county's program have at one time or another attended training at Research Triangle Park. In the past several years, no employees have attended because of the high tuition rates. Administrators believe that the knowledge gained is not worth the cost; much information taught is not practical, and on-the-job training will suffice. The Section's personnel, however, attend training offered by Region IV EPA's Surveillance and Analysis Division, when available.

The Fulton County personnel also attend the "Smoke Training School" offered by the Air Protection Branch of the State EPD three times per year in

Atlanta. Persons from Region IV EPA, industries, and EPD, attend, as well as State patrolmen and city and county police. After attending the sessions, those who pass appropriate tests are "certified smoke readers".

The Air Protection Branch has also developed courses pertaining to source sampling procedures for helping industries in conducting these processes. These sessions are held as needed and last four or five days. The latest session was held over a year ago, and 40 persons attended, some from EPA. Courses are also held for industries relating to ambient air sampling, which also last four to five days. The last course was held two to three years ago and 40 persons attended. Both types of courses would be offered on a more frequent basis if there were more need.

According to records of the Air Pollution Control Institute at Research Triangle Park, during Fiscal Year 1976, a total of 69 persons from within the State of Georgia attended air pollution courses. Nine of these were from the State, and none from Fulton County.

E. Career Potential

Within the next five years no new types of careers are expected to emerge at the State or local level. Further, workforce increases in the public sector are expected to be minimal, estimated at approximately one percent annually, on the average.

A new program being developed related to ozone and carbon monoxide emissions by automobiles may require workforce trained in testing tailpipe emissions for these compounds. If testing is carried out by the private sector, automobile mechanics who provide automobile inspections will take on the added responsibilities, after having had the appropriate training. If carried out by the State, persons with basic automotive understanding will be required, and again, training must be provided regarding testing and analysis procedures.

The majority of major emissions sources within the State are meeting regulations and a maximum annual growth rate of 10% is estimated for the workforce involved in meeting air standards. Industries apparently will continue to utilize professionals (scientists and engineers) and technical staff (those with associate degrees or have basic knowledge gained through on-the-job experience).

Future career possibilities in the area of land use control in relation to air quality control may open up in the future, according to professionals within the Air Protection Branch. Land use control is currently prohibited in the State. However, speculation concerning the adoption of certain of these measures is occurring. This situation would require input from such disciplines as city planning, architecture and political science, and all levels of government would be impacted.

Increased needs will probably occur for highly skilled professionals for product development, according to sources, as regulations become more stringent. However, this type of work most often is performed out of corporate headquarters, most often out of the State.

F. Conclusion

The air pollution control field in Georgia is currently staffed by engineers, scientists, and associate-degreed and non-degreed technicians. Few career opportunities are expected to be available in the public sector in the next five years, in large part due to the limited funds that are available. The private sector appears to be well staffed for meeting current requirements. However, future adoption of more stringent regulations may require some growth in workforce. This growth, however, will probably be quite limited. Field research suggests that less than fifty additional professionals and technicians will be required within the next five years.

Much of the training needs have previously been met by the Air Pollution Training Institute at Research Triangle Park. High tuition rates have recently caused limitations, especially in the public sector, as to the numbers of persons that can participate. Through the development of a regional training committee, federal, state and local personnel are forming strategies for filling current training voids.

A training need has been identified by public and private sources related to air sampling. These types of procedures are difficult to teach in colleges and training institutions, however, because equipment varies from one agency or industry to another, and technological advances occur rapidly, causing overall instrumentation changes.

Personnel at all levels in the public and private sectors working in air pollution control have often not had previous training or education in the field, and skills are often taught on the job or through the use of technical courses. Unless more specific institutional air pollution control programs are developed, technical upgrade opportunities must continually be made available for new entrants and for on-line personnel to keep abreast of new developments in the field. Especially within the public sector, where budgets are extremely limited, courses must be conveniently-located and at reasonable cost.

II. NOISE

A. Introduction

In 1973, a three-member special subcommittee was established within the Georgia General Assembly's House Ecology and Health Committee. This subcommittee was given the responsibility of assessing the environmental noise problem in Georgia, and of considering possible legislation. Following the creation of this subcommittee, a public hearing was held in the State Capitol, in which testimony came from citizens and governmental officials from throughout the State.

> Typical community noises were mentioned including surface and air transportation sources, industrial activity, and recreational noise. The predominant public responses dealt with noise as a general nuisance, interfering with the comfort of their life style. Noise was implicated as a serious health hazard in intense noise areas where sensitive land uses were within the vicinity of airports or highways. Further testimony from conservationists, governmental officials, and members of the professional acoustical community strongly supported the need for legislative action to protect the public's health and welfare. [1]

Subsequent to this public hearing, the subcommittee prepared enabling legislation to enable the Department of Human Resources to develop a noise control plan, to provide a declaration of policy describing the need for the State to enact noise controls, and to provide for the submission of proposed noise levels to the 1975 Session of the Georgia General Assembly. The bill (House Bill 451) was introduced in the Senate, received strong support, and was passed. The Noise Control Act was signed into law by

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[1] Clifford R. Bragdon, Joseph Burton, Maurice A. Mock, Charles A. Head and David Taylor,"Establishing Georgia's Statewide Noise Control Program", Sound and Vibration (December, 1974): p. 12.

Governor Jimmy Carter, requiring that the Department of Human Resources prepare a Noise Control Plan by November 1, 1974.

Two professionals within the Department of Human Resources were assigned to the noise control program on a full-time basis. Assistance was obtained from graduate city planning students of the Georgia Institute of Technology, from audiologists enrolled at the University of Georgia, from the Fernbank Science Center, and from high school honor students. Dr. Clifford Bragdon of the Georgia Institute of Technology, who had been involved with this endeavor from its inception, also provided assistance in the development of the plan and related activities.

Among the activities carried out following the passage of the Act by the above personnel was a vehicular noise survey in the metropolitan Atlanta area. A survey of public schools was also conducted to determine the extent to which the educational process was affected by environmental noise. Also, an index of potential noise impact was prepared for each city, based upon the numbers and types of industrial concerns in the area and their potential noise generation. Subsequent field data was gathered to compare the predicted noise impact with actual noise monitoring along industrial property boundaries. Finally, the Department of City Planning at the Georgia Institute of Technology performed a survey of municipal noise ordinances in the State.

Results of these investigations confirmed the belief that noise pollution is a significant problem in the State, and data gathered became the basis for preparing a noise control plan.

Meetings were held every two weeks for a period of one year in which representatives from many State offices, conservation groups, local governments and industries contributed their input into the plan. The final draft of the plan underwent legal review before submission to the House Ecology and Health Committee, and finally to the Georgia Assembly in January of 1975. The bill did not pass, nor have subsequent endeavors succeeded. Georgia, then, has currently no restrictions for environmental noise, except in relation to mass gatherings and as controlled by local ordinances.

B. Workforce Profile

The noise control unit that was formed as a result of the Noise Control Act is currently located in the Special Operations Unit of the Division of Physical Health, Department of Human Resources. One person presently is employed full-time for noise control activities, as one individual was diverted during 1976 to Occupational Health. Mr. Richard Osgood, the current staff member, exerts a major portion of his efforts in answering statewide complaints. When a complaint is received, special sophisticated recording equipment is used to measure sound levels, and the data are brought to the office and analyzed on a mini-computer. A report is issued, with recommendations for action. If a problem is found, the noise source is urged to take positive action. If alleviation of the problem does not ensue, the complainant may sue the noise source, and Mr. Osgood will testify on his/her behalf, providing the sound measurement data.

The noise control unit has served as a consultant to such agencies as the Georgia Department of Transportation and the Department of Education. Advice has also been sought from the industrial sector, chiefly with regard to construction barriers for noise muffling.

Complaints received by the U.S. Environmental Protection Agency from Georgia are passed to Mr. Osgood. Appropriate action is taken, and follow-up reports to EPA are made.

During 1976, the noise control unit began an investigation of noise control ordinances in Georgia. Questionnaires were sent to all communities to ascertain if any ordinances exist, the number and types of complaints received, and the need for technical assistance. Results of this survey will be published when finalized, but preliminary analysis suggests that the major noise problem in the State stems from automobiles and motorcycles. Many communities expressed a need for vehicular/muffler ordinances, and as a follow-up to this survey, Mr. Osgood developed a model noise ordinance patterned after those developed by EPA and the State of Florida. Copies will be sent to all communities that requested assistance or information on the survey form.

As repeated attempts by the unit to facilitate passage of State noise control legislation have failed, plans are to change the approach, and work toward the adoption of Rules and Regulations into the State Health Code. The possibility of having enacted enabling legislation, possibly to set up a Board, however, has not been completely dismissed. Irrespective of from where the authority will stem, plans for implementation of a noise control program have not altered appreciably since the development of the first plan. As described by Dr. Clifford Bragdon in Sound and Vibration , there are five elements in the noise control plan that will be actively pursued. These elements are:

1) Noise Regulations: Quantitative noise emission levels are proposed for mobile and stationary sources, and noise associated with three categories of land use will be regulated. The Department of Human Resources is also empowered to provide technical assistance in the areas of enforcement, land use planning, and in the preparation of specifications for acceptable noise levels for buildings and personal property purchased with public funds. Assistance is to be provided to State agencies, local governments and local law enforcement agencies.

2) Organization and Administration: Responsibilities in noise control are outlined, and staffing levels needed to effectively manage the program are defined.

3) Measurement and Analysis: Noise measurement procedures for implementing the plan have been developed, and technical courses will be offered to the Department of Public Safety, the Department of Transportation, and the Department of Human Resources for aiding the implementation of the proposed provisions.

4) Implementation: Fiscal support for personnel and equipment will actively be sought, and noise measurement requirements and methodologies have been devised. Existing resources will be maximized.

5) Education: The unit has and will participate in educating State officials and the general public regarding noise effects and the noise control program plans.[2]

The Georgia Department of Transportation employs one full-time person, Mr. Mike Connors, for noise analysis and control functions which assure compliance with federal regulations. In addition, two persons from each of the Department's district offices and three more in the central office perform noise monitoring as a part of their overall job functions. When problem areas are identified, the Department develops plans for lowering noise levels to the population, such as constructing noise barriers, or limiting the number of trucks allowed in certain areas.

Also located in Georgia are the U.S. EPA Region IV Offices. During 1976, two persons worked full-time in noise pollution control.

State Health Department sanitarians located in Georgia's counties have been provided training in noise control, but in their jobs currently only receive noise complaints, which are passed on to the State. At least 70% of the 451 sanitarians have received this training, and at least one is located in every county.

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[2] Ibid., pp. 14-15

According to a recent survey, 29 cities in Georgia have some type of noise ordinance. The following table depicts the type of ordinance each city has:

TABLE V

STATE OF GEORGIA

Municipal Noise Ordinances

City	Nuisance	Zoning	Vehicle	Aircraft	Railroad	Construction	Recreational Vehicle
Alma	0		0				
Atlanta	0						
Camilla	0	X					
Carrollton	0		0				
Claxton		X					
College Park	X	X	0	X		X	
Columbus	0		0				
Cordele		0					
Dacala			0				
Danielsville	0						
Decatur	0						
Flowery Branch	0						
Forest Park	0		0		0	0	0
Griffin	0						
Hapeville	0						
Kingsland	0						
Lake City	0						0
Louisville	0						
Macon	0		0				
Moultrie	X	X					
Newnan	0	X	0				
Peachtree City			0				
Rincon	0						
Riverdale	0						
Savannah	X	X	X			X	X
Tyrone	0						
Warner Robins		X					
Waynesboro	0						

Key: X - Regulations including acoustical criteria
0 - Regulations not including acoustical criteria

(Chart exerpted from Sound and Vibrations, December, 1975
Clifford R. Bragdon, Contributing Editor.)

Rather than employing special staffs for noise pollution control, cities to a large extent rely upon local police departments to enforce those regulations that do exist. According to Mr. Osgood, the City of Atlanta has been promoting the adoption of more specific regulations, and Dekalb County has recently adopted blasting regulations. However, no noise control staffs exist at this time.

Environmental noise control functions in the industrial sector are limited, because of the absence of strict controls. However, if work is done in this regard, it is usually carried out by persons in the environmental health sections of plants or by the plant safety engineers. Dr. Charles Hickman, noise control engineer of Southern Services, Inc., who has served as a noise control consultant throughout the Southeast, states that many major industries utilize the services of consulting firms for in-plant and environmental noise control and abatement. Three consulting firms with this type of expertise are known to exist in Georgia. Smaller companies, according to Mr. Osgood, rely upon State technical assistance for controlling noise levels.

C. Workforce Projections

Mr. Osgood anticipates continuing to work for passage of Rules and Regulations in the State Health Code, or for enabling legislation. However, new administrators have joined the Department of Human Resources, and a redirection of efforts could take place.

As presently foreseen by Mr. Osgood, and as developed in the initial noise control plan, five to six new people (engineers,degreed scientists and technicians) would be hired if implementation of the complete program commenced. Persons with strong science backgrounds would be sought with coursework in physics and mathematics, and emphases in acoustics. Sanitarians in the counties would be utilized to a greater extent, although a larger number would probably not be needed. A relatively decentralized program is anticipated, with technical assistance and field sampling enforcement carried out at the State level, and the remainder of the enforcement activities carried out by the sanitarians.

Under the present circumstances, Mr. Connors feels that an increase might occur in the number of full-time noise specialists in the Department of Transportation. Although the number of highway projects is not increasing, more concern for noise problems is evident both by the Department and by the general public, which may require several more noise analysts. If State legislation or Rules and Regulations are implemented, federal-aid projects would not be affected unless State controls were stricter than the current federal controls. However, State-aid projects would require additional personnel engaged in noise measurement, analysis, and in engineering design.

U.S. EPA Region IV anticipates that its staff of two may increase to four or five in the next five years. These positions would include one or two engineers and possibly a scientist and a grants coordinator.

State controls may also require a greater amount of expertise to be available to the private sector. However, industrial environmental noise problems within the State are not significant according to survey information, and those that are not in compliance will probably be able to handle their problems with existing personnel, through the use of private consulting firms, or with technical assistance provided by State personnel.

If no noise legislation or Rules and Regulations are passed, workforce levels are expected to remain stable throughout the State, and the possible exception of those within the Department of Transportation. If additional community ordinances are passed, it appears that they will be limited to vehicular noise, and it seems safe to assume that enforcement in these communities will also be carried out by law enforcement officers.

D. Training and Certification

Within the Department of Human Resources, on-the-job training would definitely be offered to new entrants. This would be used to acquaint new personnel with basic bureaucratic procedures, and to provide an orientation regarding the use of equipment and methods for conducting surveys. Upgrade training opportunities would also be provided to employees as often as possible. Mr. Osgood and a previous member of the noise control unit have attended university short courses, or those offered by EPA, and each averaged three or four per year. The courses offered are primarily basic engineering courses, or those pertaining to noise control administration. Examples of universities that offer related courses are Purdue and Pennsylvania State University. In addition to these short courses, professional conferences are attended as often as possible.

The Division of Physical Health offers a training course to State Health Sanitarians who are located in Georgia's counties. This sanitation course is taught twice a year in Atlanta, and generally lasts nine weeks. One to one-and-a-half days of this training course pertains to noise control and has been taught by both Mr. Osgood and his previous associate. The course covers the existing noise program, and informs the sanitarians of the extent of their authority. Approximately 70% of the 451 sanitarians have received this training, and Mr. Osgood's goal for 1980 is that all will have received updated training in noise control. If Rules and Regulations or legislation is passed, training will necessarily be broadened in scope, as activities and authorities of the sanitarians will increase with regard to noise pollution control.

Mr. Osgood firmly believes that public awareness must be heightened in Georgia. An application has been made by EPA for grant monies to be used along these lines, with emphasis in elementary schools. No action by EPA has been taken.

Those that perform noise monitoring for the Department of Transportation have usually had no prior experience in the field. Many of these persons have attended training offered by the Federal Highway Administration while others are trained in-house.

E. Career Potential

Unless Rules and Regulations or enabling legislation is passed within the State, career opportunities within the field of environmental noise control will be extremely limited. If authority is gained, however, needs will exist at the state level for persons with expertise in the fields of physics, mathematics and acoustics. A mix of backgrounds will probably occur, utilizing engineers and scientists, and possibly technicians. The bulk of program implementation, however, would be carried out by sanitarians already located within the counties.

Industrial noise is not considered a crucial problem in Georgia from an environmental standpoint, and problems that occur will probably continue to be handled by in-plant safety engineers or by private consulting firms.

F. Conclusion

In 1973, a special subcommittee was established within the Georgia General Assembly's House Ecology and Health Committee for assessing the noise pollution problem in the State. Public hearings were held, and enabling legislation was proposed. This bill, The Noise Control Act, was signed into law, and required that the Department of Human Resources prepare a noise control plan by November 1, 1974.

The Department was staffed with 2 persons for these activities, and with assistance of other individuals and groups, carried out background studies, and developed the required plan and proposed legislation. All subsequent attempts towards enactment of this legislation have failed, and while the Department has not abandoned all hopes with regard to enabling legislation, efforts have at least partially been redirected toward the passage of pertinent Rules and Regulations, to be incorporated into the State Health Code.

During 1976, the staffing level of the noise control unit was reduced to one, and this person provides functions mainly in the areas of technical assistance, training, and monitoring as a response to complaints. If authority and funds were granted, five to six persons would be added to the unit, and services of State Health sanitarians would be utilized for enforcement.

Results of a Departmental survey preliminarily indicate that individuals in the State find vehicular noise to be the most distressing. Industrial noise is not currently a serious problem, and few industries employ personnel chiefly for environmental noise control and abatement. Many major companies utilize the services of private consulting firms, while smaller ones depend upon technical assistance from the State.

Input from State and private individuals in the field indicates a general feeling that states, and specifically Georgia, will continue to face innumerable obstacles without Federal legislation. These obstacles include the lack of citizen concern and awareness and opposition from state legislators for developing comprehensive noise control programs.

III. PESTICIDES

A. Introduction

The Pesticides Division of the Georgia Department of Agriculture is responsible for the enforcement and implementation of the Georgia Pesticide Control Act of 1976. The legislation was introduced to the Georgia General Assembly, and subsequently passed in order that Georgia's laws would conform with federal laws, and so that Georgia could assume responsibilities required under federal law. The Pesticide Use and Application Act provides authority for regulation of all pesticide use, except for pesticide use regulated under the Georgia Structural Pest Control Act. The Pesticide Control Act regulates the distribution, sale, transportation, use and disposal of pesticides.

The Pesticides Division is responsible for certifying all private and commercial applicators, as well as dealers of restricted-use pesticides. It also licenses processors and dealers of treated timber, under the Georgia Treated Timbers Act. Registration of restricted-use pesticides also takes place in this Division. Under the Pesticide Use and Application Act, the Commissioner of Agriculture is authorized to appoint a Pesticide Advisory Board to offer advice on all matters relating to pesticides, their use and application.

The Entomology Division of the Georgia Department of Agriculture administers the statewide program for enforcement in structural pest control, plant inspection and quarantine, bee inspection, nursery inspection and insect control and eradication. As provided in the Structural Pest Control Act, the Structural Pest Control Commission is responsible for providing advice, policy and overall direction to the Division in matters pertaining to structural pest control.

Applicators uner the jurisdiction of this Act have been licensed in Georgia since 1955. All other commercial applicators have been licensed since the passage of the Georgia Pesticide Use and Application Act of 1972. Examinations, however, have been redesigned to meet current standards.

Extension Specialists from the Cooperative Extension Service conduct applicator training for all commercial applicators, and county agents present the training to private applicators. The Structural Pest Control Commission administers and grades applicators in the category for which it is responsible, and issues licenses, while the Pesticides Division performs these functions for all other categories.

The Laboratory Division of the Department of Agriculture contains two laboratories that perform pesticide-related analyses. The Pesticide Laboratory analyzes pesticides to determine if they conform to their label guarantees, while the Pesticide Residue Laboratory analyzes samples for determining pesticide residue content. These samples include all kinds of food for human consumption, animal feeds and feed ingredients, soils, water (pond and well). stomach contents and body organs from human and animal sources.

B. Workforce Profile

Within the Pesticides Division, there are currently thirteen employees: one director, one assistant director, one section chief, seven pesticide field agents, and three clerical employees. The Georgia Merit System requires that a Pesticide Field Agent I have a bachelor's degree with major coursework in agronomy, botany, chemistry, entomology, horticulture, plant pathology or a closely related field. The Division seeks personnel who have strong backgrounds in entomology, chemistry and agronomy. Experienced persons with these backgrounds are difficult to recruit. Among the duties of the pesticide field agents are the following:

1) To check commercial pesticide applicators to ensure proper licensing and record keeping, and to check new businesses for licenses.

2) To inspect applicators for proper storage and disposal of chemicals, and to inspect application equipment.

3) To sample pesticides being applied or sample damaged materials and submit to the laboratory for analysis.

4) To make independent investigations of complaints alleging misuse of pesticides, and appear in court as expert witnesses if needed.

5) To give advice to applicators or make independent on-site investigations concerning chemical spills or poisonings and safe storage and/or disposal of pesticides and pesticide containers.

The Entomology Division is headed by a director that administers all programs within the Division. Ten additional persons in the Division work full-time in the pesticides field: one supervisor of inspections and eight structural pest control inspectors. The supervisor assigns work to the inspectors, who inspect completed pest control work for compliance and investigate complaints and suspected violations or misuse.

The Georgia Structural Pest Control Commission utilizes two staff persons. The Chairman presides over meetings of the Commission and coordinates examining and licensing of operators. The Secretary of the Joint Examining Boards acts as the recording secretary to the Commission.

One entomologist in the Georgia Cooperative Extension Service, who works half-time for EPA, is responsible for conducting and developing the pesticide training program. In addition, approximately 30 extension specialists are responsible for training commercial applicators and county agents. Two hundred and twenty-two county agents perform pesticide training on a part-time basis.

Also within the Extension Service are four extension specialists that coordinate activities related to integrated pest management. These specialists work under contract to the U.S. Department of Agriculture and hire college students in the summertime to perform "cotton scouting". The students survey cotton fields in the State to assess the degree of pest infestation. Thresholds are established for the application of pesticides to infested fields, and alternative pest management practices are explored.

The Pesticides Residue Laboratory employs two degreed chemists and three technicians who have high school educations and have been trained on the job. The Pesticides Laboratory employs two chemists and two technicians.

As of March 31, 1977, 7,521 certificates to commercial applicators had been issued by the Department of Agriculture in the following categories:

Category	Number
Agricultural Pest Control	
Plant	2,050
Animal	201
Forest Pest Control	264
Ornamental and Turf Pest Control	1,118
Seed Treatment	180
Aquatic Pest Control	268
Right-of-Way Pest Control	348
Industrial, Institutional, Structural and Health-Related Pest Control	1,422
Wood Destroying Organisms	
Household Pest Control	
Fumigation	
Public Health Pest Control	140
*Regulatory Pest Control	61
*Demonstration and Research Pest Control	1,124
Aerial Application	345
Total:	7,521

*This is actually a sub-heading under each of the major categories, as appropriate.

The Director of the Pesticide Division has estimated that the above total represents approximately 95% of all commercial certificates to be issued by October 21, 1977. Under this assumption, 7,916 certificates will be issued by that date. It should be noted that this does not represent the total number of persons applying restricted chemicals commercially, for several reasons. First, many people obtain certification in two or more categories and second, after the law was passed, many persons rushed to become certified "just in case" but have never been involved in the application of restricted pesticides. Numbers, then, are somewhat inflated in terms of total workforce.

The Pesticide Division estimates that 45,000 farmers will require certification in 1977. As of March 31, 1977, approximately 47% of these had demonstrated suitable competency.

Also located in Georgia is the Pesticides Branch of the U.S. EPA Region IV in Atlanta.* Within the Pesticide Branch, employees working within the State in 1976 included twelve consumer safety officers, one technician and six clerical employees.

The total estimated pesticide and pest control picture is reflected in the following table, in which figures are approximations of the workforce engaged in pesticides activities on either a full- or part-time basis.

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*For more detail regarding the workforce, and activities of the Pesticides Branch, refer to the Region IV report.

TABLE VI

PESTICIDE DIVISION

Current (1976) Georgia Workforce Staffing Level
Public and Private Sectors

Public Sector		1976
Department of Agriculture:		
Pesticides Division		13
Entomology Division		11
Laboratory Division		9
Cooperative Extension Service:		
State Extension		35
Field Operations		229
Structural Pest Control Commission		2
U.S. EPA Region IV		19
	TOTAL	318
*Private Sector		
Farmers		45,000
Owners/Operators/Applicators		7,916
	TOTAL	52,916

*Private sector figures actually reflect levels as of March 31, 1977.

Augmenting these figures are approximately 1,000 to 1,200 pesticide dealers who are required to register with the Pesticides Division, plus an estimated 300 or more applicators using disinfectants or sterilants which are expected to evenually need certification when EPA identifies which of these products will be classified for restricted use. Although these dealers are not required to submit to a certification process, many have become voluntarily certified in commercial categories.

C. Workforce Projections

Sources in the field indicated that increased numbers of personnel at the state level will not be required during the next five years to continue operations of existing programs. Further, shifts in priorities or changes in activities are not expected to occur. In the training arena, those currently involved in pesticide training and course preparation will be continually involved, as the State plans to require recertification every five years, and new course material must continually be prepared.

Dramatic growth is also not expected for commercial applicators. According to sources in the field, however, college agricultural graduates are entering into pesticide application phases of work, estimated at approximately one hundred per year, concentrated in the areas of plant agricultural pest control and ornamental and turf. With these factors in mind, it appears that a balancing might occur, whereby the total number may remain relatively stable, although an upgrading will occur in terms of skill and educational background. Presently, the workforce in the field is felt to be sufficient, and it is not felt that greater numbers will be required in the next five years.

Within U.S. EPA, Region IV, increased staffing levels are predicted in the Pesticides Branch in Atlanta. Seven or eight professionals and three or four clerical employees are expected to be added within the next five years, because of increased responsibility in the pesticide programs of registration, field investigation and accident investigation. In addition, the Pesticides Branch may be reorganized to become the Pesticides and Toxic Substances Control Branch, in which case additional personnel will be required, though not added until Fiscal Year 1978. EPA hopes to add 32.7 person-years of effort in 1978 and 49.5 in 1979 for toxic substances. Longer terms forecasts are unavailable.

D. Training and Certification

The Pesticides Division sponsors training sessions twice a year for staff personnel. Sessions last two or three days, eight hours per day, and cover all phases of operation, including administrative and enforcement regulations. Courses in pesticide control are offered by the Public Health Service, in which State regulatory personnel often participate. State field agents must also pass examinations for each application category under federal regulations. State employees may also become involved in administrative and employee development courses offered by the State Merit System.

Training for commercial applicators to cover the General Standards is based on the EPA Core Manual and is presented by teams of extension specialists from the Cooperative Extension Service. Training for commercial applicators to cover specific category standards is presented by the specialists following the general standards training. These sessions are based upon manuals prepared by the Cooperative Extension Specialists working closely with the Georgia Department of Agriculture. Training for general standards requires a little more than one day, while category standards requires about one-half day. At the completion of the category training, a pesticide field agent from the Pesticides Division administers the examinations for both the general and category standards. Examinations are forwarded to the Pesticides Division where they are received and forwarded to the Department of Agriculture Data Processing Section for computer grading, data storage, and ultimate print-out and mailing of certificates.

Training for pest control operators, including structural, household and fumigation is provided by the Extension Specialists to cover the general standards only, as current requirements for competency in these subcategories exceed the minimum standards imposed by EPA. Examinations are administered and graded by the Structural Pest Control Commission. An agreement between the Commission and the Pesticides Division states that the program will, at a minimum, meet federal guidelines. The Commission furnishes applications and test scores to the Pesticides Division, which issues certificates.

County agents have been trained by extension specialists and are certified in the categories of Plant Agricultural and Demonstration and Research. These agents, in turn, train farmers for private applicator certification based on the EPA core manual for private applicators, utilizing lectures, discussions, and slide-type presentations. These sessions generally have lasted about three hours, and were held weekly in every county during November of 1976 and, to some extent, extending into December and January of 1977. A major effort will be made during September and October of 1977 to have every farmer certified who will use restricted pesticides.

Training to commercial and private applicators will continue along similar lines, and as the State has opted to require recertification every five years, new training manuals, training plans, and exams will require development within the next several years. While EPA furnished a large portion of these materials for the first year, no further commitment has been made by EPA to furnish subsequent materials. Therefore, states will develop their own materials. According to State officials, this method is not as cost- or time-efficient as it would be for EPA to develop the materials.

Some major pesticide manufacturing firms in the State offer application training, often directly to farmers Others offer training for a fee, mainly for category #7 - Industrial, Institutional, Structural and Health Related Pest Control. This training is not directly endorsed by the State.

E. Career Potential

Within the State agencies, it appears that career opportunities will be limited by a slower rate of expected growth over the next five years. Therefore, opportunities should exist only as a result of turnover, which has been very low, averaging less than 10% in recent years. In the State, at EPA Region IV, a greater number of job openings is expected to occur, not only due to expanded involvement under FIFRA, but also due to the recent passage of the Federal Toxic Substances Control Act. Persons with backgrounds in the biological, environmental, or agricultural fields with knowledge of chemistry should be in increasing demand by 1978.

Although moderate growth in numbers of pesticide applicators is projected by State personnel, it is believed that the profession as a whole will be upgraded, due to the entrance of trained professionals into the field, the increasing complexity and toxicity of chemicals and more stringent regulations. While the typical new applicator at the present time has had limited background in the field, it is believed by State professionals that one will gradually see highly specialized applicators and consultants emerging. The field will be open to all levels of professionals, from two-year, four-year and graduate level programs.

The State has begun to investigate the field of integrated pest management more thoroughly than it has in the past, and activities in this area are increasing. Efforts to date have been well-received by farmers, and it appears that experts in the field will be in increasing demand, due to the rising costs of energy for running tractors and chemicals to be applied. Georgia appears to have a market for private consultants and experts in the public sector to advise farmers on alternative pest control methods and to provide cost-benefit appraisals for pesticide usage. According to Extension Service sources, at least a bachelor's degree in the agricultural field with specific coursework in pest management, such as those offered at the University of Georgia, would be required to obtain the needed expertise.

F. Conclusion

While employment opportunities in pesticides at the State level are expected to be somewhat limited, U.S. EPA Region IV in Atlanta is expected to increase its pesticide staffing level, providing career opportunities for those with environmental, biological and agricultural backgrounds. Moderate growth is expected in the number of commercial applicators, although the field is expected to be upgraded in terms of applicator expertise, and educational institutions of all levels may find a market for graduates trained in all facets of pest and pesticide control. Integrated pest management is emerging in the State, and a greater demand for persons with expertise in the field is expected.

Training for applicators as required for passing certification examinations is being addressed by the Cooperative Extension Service, and this training will continue at the rate that is required, while efforts will also be channeled toward the development of manuals, courses, and examinations for recertification. To supplement these training efforts, because of the projected required upgrading of applicator knowledge and skills, a two-year vocational curriculum in pesticides and pest management may develop. The University of Georgia currently has resources and curriculums available for training higher-level specialists, who will also be in demand.

IV. POTABLE WATER

A. Introduction

The Water Supply Quality Control Act, Act Number 936, amended through 1974, assigns responsibilities to the Environmental Protection Division of the Georgia Department of Natural Resources for ensuring adequate water of the highest quality for water supply systems. Since the passage of the Federal Safe Drinking Water Act, Georgia submitted its application for State Program Grants under the Act, and received $169,700 for Fiscal Year 1976. The State's application included a letter of intent from the Governor which stated that the State intended to assume primacy of the Safe Drinking Water Act within the year. House Bill 23, the Georgia Safe Drinking Water Act of 1977, has been introduced to the 1977 General Assembly which would provide the necessary authority for the State to assume primacy under the Act.

Under definitions of the Federal Safe Drinking Water Act, there are more than 5,000 public water systems in Georgia: about 2,500 community systems and about 2,500 non-community systems. It is estimated that 3,800,000 people, or 82% of Georgia's population, are served by public water systems. There are twelve major water systems, primarily in metropolitan areas, that serve 2,262,000 people. Water supply sources in the southern portion of the State, below the fall line, rely mainly upon underground water, while the northern portion of the State utilizes surface water sources.

In 1932, the Georgia Water and Pollution Control Association was organized for the purposes of improving the operation of water plants in Georgia and elevating the status of plant operators. A Certification Committee was appointed and qualifications for voluntary certification were adopted. As population and industrial growth continued, and operations became more complex, the Association recognized the need for a mandatory certification program, and sponsored legislation which resulted in the passage of the "Certification of Water And Wastewater Treatment Plant Operators Act", which became law on April 8, 1969. One of the provisions of the Act was to issue certificates in appropriate classification to operators who, on the effective date of the Act (July 1, 1970), held certificates of competency attained by examination under the voluntary certification program of the Association.[1]

The Certification Act established a Board of Examiners to carry out the Act. The Act currently allows for representation on the Board in the following manner:

> One member from the technical staff of the Environmental Protection Division.
>
> One member who is a currently employed public water supply system operator holding a valid certificate of the highest classification issued by the Board.
>
> One member who is a currently employed waste water treatment plant operator holding a valid certificate of the highest classification issued by the Board.
>
> One member who is an employee of a municipality or county required to employ a certified operator and who holds the position of city or county manager, engineer, director of public works, or director of water supply and water pollution control.
>
> One member who is either a consultant in the field of water supply and water pollution control or who is engaged in teaching or administering courses in water supply and water pollution control in an educational institution in the State of Georgia.

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[1] State Board of Examiners for Certification of Water and Wastewater Plant Operators, Water and Waste Water Operator Certification in Georgia, Progress Report, July 1, 1975-June 30, 1976: pp.13-14.

The Board prepared Rules and Regulations, as mandated by the Act, classifying all public water supply systems and wastewater treatment plants. Rules regarding certification of operators were also prepared, as were examinations. The Board is also empowered to bring civil action against anyone in violation of the Act.

Relating to water supply control in Georgia is the Groundwater Use Act, also implemented by the Environmental Protection Division. This Act states that no person shall, after December 1, 1974, withdraw, obtain or utilize groundwater in excess of one hundred thousand gallons per day for any purpose unless that person has first obtained a permit from the Division. Applicants must specify the amount of water to be used, its intended usage, and the proposed aquifer or aquifers of withdrawal. This Act was implemented in order to conserve groundwater resources and to provide and maintain conditions which are conducive to the development of water resources.

Regulation of surface water in the State, however, is virtually nonexistent. However, Senate Bill 44 has been introduced to the 1977 General Assembly. This would amend the Georgia Water Quality Act to provide for a surface water management program requiring a permit to withdraw, divert or impound more than 100,000 gallons of water per day on a monthly basis for certain types of uses. The need for this type of legislation was pronounced by The Georgia Resources Study Committee, made up of members of both the Georgia Senate and the Georgia House of Representatives. This group issued a report in December, 1976, that stated that Georgia has fresh water supply problems now, and predicted greater problems in the future.

The Atlanta Regional Commission (ARC) prepared a "Water Supply Plan for the Atlanta Region" in cooperation with the U.S. Army Corps of Engineers, the Georgia Department of Natural Resources and the U.S. Environmental Protection Agency. During a public hearing concerning this plan, an ARC spokesman asserted that the seven-county ARC area has, under the present set-up, enough water for the next ten to twelve years. However, an emergency situation could arise during the next ten years if the area's population and economic growth mushroom in combination with a severe drought There are currently no plans to deal with the crisis. To provide for projected drastic increases in water consumption, based upon population forecasts, ARC's plan calls for strict water conservation measures, interconnections of various city and county water systems in the region, cooperation between governments to share facilities and resources, more storage of water to meet critical peak demand periods, protection of important watersheds in suburban areas and a regional plan of emergency procedures to be followed in event of a future crisis of water supplies. The Atlanta area now utilizes two water sources: the Chattahoochee River and Lake Allatoona. Water supply studies are currently also being carried out in other areas of the State.

Background has been provided concerning regulations and proposed plans regarding quantity of groundwater and surface water usage because of its strong link with the water supply's availability to the public for consumptive uses. However, the bulk of this report will be concerned primarily with current activities and programs that exist in Georgia that pertain to potable water supplies, as dealt with in the Federal Safe Drinking Water Act.

B. Workforce Profile

Functions pertaining to potable water take place in both the Water Protection Branch and the Program Coordination Branch of the Environmental Protection Division.

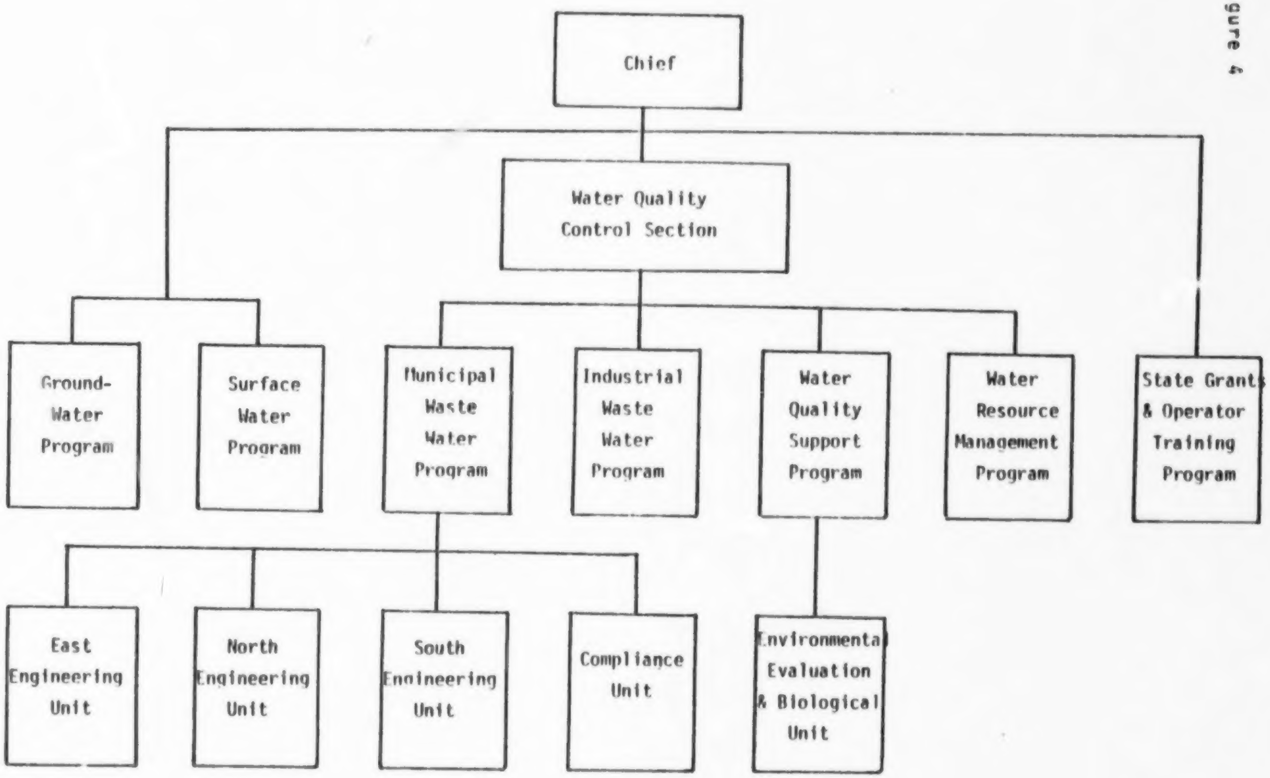
The Surface Water Program of the Water Protection Branch is responsible for all water systems that process or distribute all or in part water from streams, lakes, and reservoirs. This Program approves all plans and specifications for surface water systems and makes inspections during the construction. Inspections are performed of plant and laboratory operations, and recommendations for issuance of Certificates of Operation are released. This Program also conducts in-plant training of personnel, and ensures compliance with Rules and Regulations. A fluoridation grant program for all water systems is supervised by this Program.

The Groundwater Program of the Water Protection Branch, along with Administering the Groundwater Use Act, is responsible for public and community water supply systems obtaining their water from wells or springs. In this regard, the Program reviews engineering reports, plans and specifications for approval prior to the construction of any public or community water system construction. Inspections are also carried out during construction to assure compliance with the approved plans. The Program also completes sanitary surveys of the water system covering the operations, maintenance, treatment, distribution and compliance with the Rules and Regulations.

The Program Coordination Branch supports the water supply program both through its regional offices program and through its Water Supply Laboratory. Potable Water personnel are located in each of the Branch's

Figure 4

GEORGIA ENVIRONMENTAL PROTECTION DIVISION
WATER PROTECTION BRANCH


Chief
Water Quality Control Section
Ground-Water Program
Surface Water Program
Municipal Waste Water Program
Industrial Waste Water Program
Water Quality Support Program
Water Resource Management Program
State Grant & Operator Training Program
East Engineering Unit
North Engineering Unit
South Engineering Unit
Compliance Unit
Environmenta Evaluation & Biological Unit

regional offices (in Atlanta, Macon, Brunswick and Albany), and staff perform functions to conform with goals of the Water Protection Branch. The Water Supply Laboratory performs all of the proper analytical services required for enforcement, and personnel appear as witnesses in legal proceedings as needed.

The Groundwater Program employs two engineers and two environmental specialists for potable water programs while the Surface Water Program utilizes one program manager, one secretary, one clerk-typist, three specialists and three engineers. Within the Program Coordination Branch, the Water Supply Laboratory employs nine scientists, one data entry clerk, one clerk-typist and three laboratory aides. Within the regional offices, six persons are budgeted for potable water: one engineer and five specialists. Finally, the Environmental Review Unit retains the services of one engineer for potable water.

Engineers come mainly from civil and sanitary backgrounds, while specialists are degreed persons, specifically in biology and chemistry for the most part. Environmental scientists are required to have degrees in chemistry, biology, microbiology or bacteriology. Lab aides are generally non-degreed personnel with experience in the field.

Most employees are hired though the State Merit System. Engineers, however, are often not listed on the System's register. Therefore, each winter and spring, Water Protection Branch personnel visit universities with graduating students in an effort to get more names of qualified people on the register.

The following table depicts the total numbers of persons in the Environmental Protection Division currently working in the area of potable water:

TABLE VII

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Potable Water Program Operations
Current (1976) Staffing Level

Position	1976
Engineer	7
Scientist	19
Technician	3
Other*	5
TOTAL	34

*Includes 1 administrator, 3 clerical, 1 data entry aide

As of June 30, 1976, there were 1,247 water plant operators holding active certificates in the State. Operators-in-charge are classified in categories I to IV according to the plants they operate. Other operators need not be classified at the level of the plant. Classifications are further broken down into the following categories: Groundwater, Surface Water and Water Distribution. Class I is the highest level.

The following table depicts the current number of certified operators, by category:

TABLE VIII

STATE OF GEORGIA

Plant and Water Distribution Systems Operators
Current (1976) Georgia Certified Treatment

Classification	Class I	Class II	Class III	Class IV	Total
Groundwater	4	56	239	167	466
Surface Water	52	265	302	92	711
Water Distribution		16	35	19	70
TOTAL	56	337	576	278	1,247

It should be noted that some operators hold certificates in more than one category, so that numbers of active certificates are not the same as the numbers of persons certified. Therefore the number 1,247 is necessarily larger than the actual number of operators.

The State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators completed its second Municipal Operator Certification Survey during 1976. This survey led to a large number of municipalities obtaining compliance with the Certification of Water and Wastewater Treatment Plant Operators Act and the Rules of the Board. The survey revealed that 1,126 operators were employed at municipal facilities, of whom 769 were properly certified. Even though a number of municipalities were found not to be in compliance, officials of most of those agreed to obtain compliance as soon as possible.

Information concerning the number of persons working in water treatment plants other than operators is not readily available. However, in 1968, the Georgia Department of Labor, Employment Security Agency conducted a survey which provided current workforce profiles and projections for 1970 and 1973. Although this data is out-of-date, and the field has grown appreciably since that time, one could utilize the known number of municipal operators and its growth pattern, and make estimates regarding the current levels of all other personnel. According to administrators within the Water Protection Branch, this method might offer some reliability, although the number of laboratory technicians has probably increased during this period more than for other personnel. Accordingly, the following table depicts 1968 workforce levels, as provided by the Georgia Department of Labor, and current workforce estimates, based upon available data:

TABLE IX

STATE OF GEORGIA

Water Treatment Plants and Distribution Systems 1968 and Estimated 1976 Staffing Level

Position	1968	1976 (est.)
Treatment Plants		
Professional		
Administrative	37	82
Engineer	14	31
Chemist	9	20
Other	7	16
Supervisor(non-operator)	76	169
Technician		
Laboratory	32	85*
Electrical	12	27
Aide	14	31
Operator	498	1,126
Unskilled	175	389
TOTAL	874	1,976
Systems (Other Than Plant)		
Professional	40	89
Technical	218	484
Skilled	510	1,133
Unskilled	873	1,940
TOTAL	1,641	3,646
GRAND TOTAL	2,515	5,622

*Computed as others, plus 20%

It should be kept in mind that activities in relation to potable water supply in the State also take place at U.S. EPA, Region IV, located in Atlanta, Georgia*. The 1976 workforce levels in this field are approximately as follows: nine engineers, three scientists, one technician, and three "other". At the regulatory level, then (Federal and State) in Georgia, currently approximately 50 persons are servicing the field.

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* For more information regarding such activities, the reader should refer to the Region IV report.

Private consulting engineers, too, provide services in the design and construction of water treatment facilities. Specific numbers, however, are not readily available, although State EPD officials indicate that no shortage exists at the present time.

C. Workforce Projections

Workforce projections for potable water activities within the Environmental Protection Division and for statewide operations personnel are based upon the best professional judgements of administrators within the Water Protection Branch. These administrators have indicated that for Fiscal Year 1977, 36 new positions have been applied for, and hopefully will be added to the potable water program, for carrying out the State's role of the Federal Safe Drinking Water Act after primacy is achieved. These new positions, which have already been committed by the Governor, will consist of the following: nine engineers, eleven scientists, fourteen environmental specialists and two clerk-typists. Five-year projections provide for an increase of twenty-five additional personnel, in the same categories as sought for 1977.

Based upon the above information, the following table projects future workforce levels within the Environmental Protection Division:

TABLE X
GEORGIA ENVIRONMENTAL PROTECTION DIVISION
Potable Water Program Operations
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	7	16	18	19	20	21	10%	31%
Scientist	19	44	49	53	57	59	5%	33%
Technician	3	3	3	4	5	5	5%	12%
Other	5	7	8	9	10	10	5%	16%
TOTAL	34	70	78	85	92	95	6%	27%

Turnover rates are estimated at ten percent for engineers and five percent for all other positions. Engineers are currently in greater demand, and can easily find more lucrative positions with private industry, consulting firms or the federal government.

Substantial increases are projected within the water supply program at U.S. EPA due to increased responsibilities required under the Safe Drinking Water Act. New positions would include hydrologists, geologists, chemists, engineers, technicians and clerical personnel.

Based upon the number of water treatment plants currently being constructed, expanded and upgraded, coupled with stricter enforcement of the certification law, EPD administrators project a need for 1,000 additional certified operators over the next five-year period. The proportions of operators in categories I through IV will remain similar, although a slightly greater increase may occur at the level I, because plants are becoming more complex, requiring operators with higher skill levels.

Assuming that growth will occur at a constant rate over the next five years, and that the skill level will demonstrate upward shift, the following table depicts estimated projections for certified water treatment operators, based upon the available information:

TABLE XI
STATE OF GEORGIA
Water Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum growth average
I	56	90	124	157	191	225	33%
II	337	404	472	539	607	674	15%
III	576	650	723	797	870	944	11%
IV	278	303	328	354	379	404	8%
TOTAL	1,247	1,447	1,647	1,847	2,047	2,247	13%

* Current numbers represent the number of active certificates.

Effort has not been made to provide specific projections regarding the workforce in water treatment plants for employees other than operators, as the data base is, in itself, an estimate. However, it appears that needs for other personnel may increase at a similar or slightly lower rate than for certified operators. The number of chemists and laboratory technicans, both in and out of the treatment plants, however, should increase proportionately to the number of certified operators, as testing requirements become more stringent under the Federal Act, and as procedures become more complex. Whereas in many instances operators have conducted the needed analyses, new specialized personnel may be hired to perform these functions.

Few data are available regarding turnover rates within treatment operations. Indications are that the turnover rate declined sharply after mandatory certification laws came into effect, and the workforce was upgraded through training processes. It is expected that rates should decline further as salaries are gradually being upgraded as skills increase.

In sum, sharp and rapid increases are expected to occur at the federal, state and local level within the State of Georgia within the next five years. Growth in the private sector, however, for engineering firms, is not anticipated by officials in the Environmental Protection Division because of the stiff competition that already exists between firms. Construction and upgrade of facilities might cause a maximum ten percent increase in efforts in the next five years.

D. Training and Certification

All new entrants into the water supply program participate in EPD's rotational program, whereby they spend time in each of the Division's program over a period of approximately six months. In addition, technical conferences and technical short courses are utilized by the Water Protection Branch for upgrade purposes. Most short courses attended are sponsored by EPA, although some are carried out by universities. Potable water personnel are also eligible to attend courses sponsored by the Georgia Merit System; administrators participate in management training, while other may attend employee development courses. The EPD also offers a graduate stipend program for professional personnel, and potable water employees are eligible.

Training for water treatment plant operators is coordinated through the State Water Grants and Operators Training Program within the Water Protection Branch. At the present time, three types of training program are being carried out, which are as follows:

1) Georgia Water and Wastewater Institute: This program moved from South Georgia Tech at Americas to West Georgia College in Carrolton on March 1, 1976. The EPD contracts with the college to provide the instructors and the services. Two full-time instructors are on the staff, and one secretary, although outside consultants and EPD staff members occasionally assist in training. Courses are scheduled for six months at a time, and include classes in wastewater, surface water and groundwater. There is no charge for these courses, which are designed for those already in the field and for those wishing to enter it. Enrollment is limited to twenty per six-month course schedule. Since the facility moved to Carrollton, there has been an absence of laboratory classes. At the present location there is not adequate space for the equipment. The laboratory equipment is now in storage, and EPD plans to build a laboratory facility on campus, although completion will be at least a year away.

2) Coupled On-The-Job Training Program: This program is a mixture of formal and on-the-job training, and participants are both entry-and non-entry level. These courses are carried out by one full-time and one half-time instructor in various vocational schools throughout the State. Classes are held one day every other week, and between class days, instructors visit students at their work sites. The course lasts six months, with 104 classroom hours and 35 hours of on-the-job training offered to each participant. EPD tries to limit class sizes to 20, but have reached nearly 40. Normally two

courses are held each year, although four were held in 1976 due to the receipt of special impact funds that are specified to go to minority schools.

3) Spring and Fall Short Course School: The EPD and the Georgia Water and Pollution Control Association sponsor short courses twice a year, in the spring in the northern part of the State, and in the fall, in the southern portion. Courses, which are held on college campuses, last four days, and are taught by instructors from educational institutions, by EPD staff, by municipal officials and by consulting firms. All instructors donate time and services. Classes do not vary widely from year to year, and cover surface water, groundwater and wastewater. Five courses are held at one time, and attendance is limited to 65 for basic courses and 35 in advanced courses. Approximately 200 attend each session, all of whom must be members of the Association.

EPD officials estimated that 800 people receive training each year in these three programs, which constitute at least 95% of all training conducted in the Division. It is estimated that 1,000 will have to be trained each year (in both water and wastewater operations) to meet the demands of new personnel and upgrade. The State can accommodate this many with a slight expansion of the existing program. However, U.S. EPA is partially supporting the Coupled OJT program, and future funding is in jeopardy. If federal funding is not continued for this program, the State will not be able to meet its requirements.

There are currently no vocational or technical schools in the State that offer training for water or wastewater plant operators. Vocational schools in Savannah and Atlanta have previously offered courses but recruitment of trainees had proven to be a problem. The vocational school in Brunswick, Georgia, may develop courses, but any training program must be approved by the State Board of Certification before graduates are eligible to be tested for certificaiton.

In sum, the State hopes to continue the current training programs, although efforts will increase during the next five years because the State is putting pressure on municipalities for operators to be licensed according to the law. In addition, an update of the Rules of the Board recently specified that Class I operators will have to attend training every two years to renew their certificates. However, actual follow-through on this will not begin until July 1, 1979. If a vocational school implements an approved program, the State EPD may be able to slightly slacken its efforts in the training area.

E. Career Potential

Within the State and Federal programs, opportunities will be fairly good for all currently-utilized occupational groups, as dramatic increases in the workforce are projected. Sanitary, environmental and civil engineers will continue to be utilized, as will degreed chemists, biologists and microbiologists. Technicians will be utilized to a larger extent although total projected numbers remain relatively small. Within EPA, scientists and engineers with backgrounds in underground injection control will be in demand.

Within potable water treatment plants in Georgia, a large increase, or nearly doubling in the number of certified operators is projected. As plants become increasingly complex, demands will occur for more highly skilled personnel. As this process may at least partially occur through upgrade, opportunities should also abound for entry level operators.

F. Conclusion

Georgia currently operates its potable water program under the authority of the State's Water Supply Control Act, although the State anticipates assuming primacy for implementation of the Federal Safe Drinking Water Act.

If this occurs, as is anticipated, staff would necessarily dramatically increase in order to assume all needed responsibilities. Regardless of whether the State or EPA administers the program in Georgia, a large increase is expected in the number of certified water treatment operators in the State. This is due not only to more stringent enforcement of the State's mandatory certification law, but also to the new construction, expansion, and upgrade of facilities.

In order to supply the number of operators with adequate training for passing certification examinations, EPD estimates that it will have to train approximately 1,000 new entry and on-line operators, or 20% above its current level. At the same time, federal funds may be discontinued for one of its major training programs. However, if this program is continued, it is expected by EPD that it will be able to expand its current efforts to accommodate the students to meet the projected needs.

NOTE: The surface water management legislation discussed in the introduction of this report was passed subsequent to the report's writing.

V. RADIATION

A. Introduction

Radiation control functions within the State of Georgia take place both in the Department of Human Resources and the Department of Natural Resources. The former Department carried out all radiation functions until early 1976, when H.B. 1907 was passed by the Georgia General Assembly. This bill transferred duties in relation to the control of the emission of radioisotopes to the environment to the Environmental Protection Division of the Department of Natural Resources.

In 1969, Georgia entered into agreement with the Atomic Energy Commission (now the Nuclear Regulatory Commission)to take control of the regulatory program for isotope users in the State. Implementation was assigned to the Radiological Health Unit of the Department of Human Resources. This Department currently issues licenses to isotope users in hospitals, colleges and industries. A machine-produced radiation protection program is also operated by this Unit, in which microwave and X-ray machines must be registered.

The Environmental Protection Division, (EPD) in its concern with environmental radiation, is conducting monitoring of potential environmental radiation sources. Within Georgia, these include the Edwin I. Hatch nuclear generating plant near Baxley (one unit operating and one under construction) of Georgia Power Company, the planned two-unit Alvin W. Vogtle plant, also of Georgia Power, to be built near Waynesboro, and a nuclear reactor at Georgia Institute of Technology. Monitoring is also conducted around several nuclear plants that are proposed, under construction or operating in contiguous states.

A chief concern within the Environmental Protection Division relates to the transportation of radioactive materials across the State. This problem may be especially significant in Georgia if the reprocessing plant in Barnwell, South Carolina begins operation and if the country decides to reprocess spent nuclear fuel from generating plants. If this occurs, shipments from plants all over the country will be passing through Georgia.

While the Environmental Protection Division holds chief responsibilities for the control of environmental radiation in the State, the Radiological Health Unit still maintains responsibility for the control of discharge of radioactive pollution into the State's waterways by hospitals and medical laboratories. This report will focus upon these environmental radiation programs.

B. Workforce Profile

When certain functions were transferred from the Department of Human Resources to the Department of Natural Resources, four positions were transferred in the process, three of which were filled in 1976. These three positions represent "radiation safety officers", at levels I, II and III. According to Georgia Merit System requirements, a radiation safety officer I must have a bachelor-level degree with major coursework in the physical sciences or have been registered as a Radiologic Technologist by the American Registry of Radiologic Technologists, with two years employment in the field. At higher levels, a bachelor degree is required, with increasing amounts of experience. Those in EPD have very high qualifications for the positions they are filling. The fourth position transferred will be filled by a high-level expert in the field, who is presently being sought.

Approximately 30 field personnel in the Program Coordination Branch are also utilized for monitoring and special studies as the needs arise.

One radiation safety officer coordinates these activities. In addition, the chief of the Program Coordination Branch has a background in nuclear chemistry and participates in radiation policy-making and activities.

EPD has entered into joint agreement with the Georgia Institute of Technology. Four experts in the field of radiation provide consultation, advice, and assistance to EPD, and the Institute provides the space for a wet chemistry laboratory. Two of EPD's radiation safety officers work in this laboratory, a chemist and a nuclear engineer.

In addition to the radiological monitoring and analysis that is carried out by the EPD, officials participate in State policy-making activities, perform reviews of environmental impact statements and bring hearings before the Nuclear Regulatory Commission when needed. The EPD is also currently involved in the development of an emergency response plan for disasters related to high level nuclear materials. Officials participate in other regional and state committees as appropriate.

To deal with the potential problem related to the transportation of nuclear materials, the Governor has ordered the director of the EPD to call a meeting between officials at the State and Federal level to discuss alternative strategies and define roles and responsibilities. This meeting will be scheduled in March of 1977, and representatives from the following three agencies will attend: the Environmental Protection Agency, the Nuclear Regulatory Commission, and the Energy Research and Development Administration. Officials also from the following State agencies will be in attendance: the Department of Human Resources, the Civil Defense Division, the Department of Transportation, the Office of Energy Resources, and the Environmental Protection Division.

The Radiological Health Unit of the Department of Human Resources licenses all radioisotopes users in the State that are not under federal jurisdiction. The radioisotope program in the Unit performs inspections of hospitals and medical laboratories to determine the amount of radioactive materials being used, the amount put into patients, and the amount discharged into the rivers. Allowable levels have been determined by the National Committee for Radiation Protection, and although it is rare for a hospital or laboratory to exceed allowable limits, inspections must be performed periodically. The director of the Unit has stated that more radioactivity is released into the environment from medical programs than from reactors, but the isotopes used medically are much shorter-lived.

During 1975, the Radiological Health Unit employed eighteen persons. During 1976, twelve were employed; four positions were transferred to the EPD, and two positions were frozen. Five of these persons work in the radioisotope program, four of whom are nuclear engineers or engineers in a closely related field, and one has a background in nuclear medicine.

Also located within the State is the Environmental Radiation Section of the U.S. EPA Region IV. During 1976, four persons were employed in the Section: a health physicist, a nuclear engineer, a bio-physicist, and a secretary.

In sum, twelve persons currently participate full-time in the public sector in work relating to environmental pollution control, as depicted in the following table:

TABLE XII

STATE OF GEORGIA

Radiation Control Section
Current (1976) Staffing Level
Public Sector

Position	1976
Engineer	6
Scientist	5
Other	1
TOTAL	12

It must be noted that input and support come from a variety of other sources, as previously mentioned. These include field, administration and clerical personnel at EPD and experts at the Georgia Institute of Technology.

In the private sector, one also finds personnel employed for radiation pollution control. At Georgia Power Company, for instance, a health physicist is employed at the operating plant that is partially responsible in this area and provides training to monitoring personnel. Approximately three persons who have received this training collect samples from monitoring stations as a part of their overall job duties. The actual analysis of samples is conducted by a private consulting firm in South Carolina, which is contracted for this purpose. Georgia Power officials indicate that they know of no firm in Georgia with this type of capability. Two professionals in the Environmental Affairs Office have had considerable education and experience in the field and provide overall direction and coordination to the environmental radiation control efforts.

Hospitals, universities, and medical labs too, often employ radiation safety officers to safeguard against isotope problems and leakage to the environment. These people may be employed on the staff or contracted on a part-time basis, although some work in both capacities. State officials in 1976 estimated that there were eight such persons in the State and twelve in early 1977.

Based upon the above information, sources estimate that fifteen to twenty persons in the private sector in Georgia are employed on a full- or part-time basis for environmental radiation control. Most have had backgrounds in health physics, although some have received training on the job, with no prior education or training in the field. In both the public and the private sectors, then, in excess of 60 persons, according to available data, are engaged in environmental radiation pollution control, most on a part-time basis.

C. Workforce Projections

Within the Environmental Protection Division, officials estimate that the staff should double within the next five years, due to the addition of three nuclear generating units in the State and anticipated activity with regard to the transportation of nuclear materials. The three additional staff members would include a nuclear engineer, a health physicist, and a technician. After this time, the workforce is expected to stabilize, as no additional nuclear power plants are expected to be constructed in the State. As previously mentioned, a highly skilled professional will be recruited in 1977, thus bringing the 1981 projected total to seven. Since the State's Legislature is considering putting a ceiling on the number of State employees, three of these four new positions may not be added. In either case, while the number of field personnel involved in monitoring and special studies is not expected to increase, actual time spent in this regard may be greater in the future.

Within the isotope program of the Department of Human Resources, continued increased workforce needs are projected, in part, because of the increasing use of radioactive drugs by hospitals and medical laboratories. Because it is anticipated that the Unit will have difficulty in gaining the required positions, officials are considering diffusing the program by training engineers in local health agencies to undertake limited responsibilities in the investigations concerning X-rays, microwaves, and less hazardous isotopes. There are ten health districts in the State, and it is hoped that one person will provide these services in each district. Several of these have adequate backgrounds to carry out these functions without further training. In addition, because the regulation of the most hazardous isotopes must be handled by the more experienced staff of the Radiological Health Unit, and since the number of licenses issued is increasing by approximately 20% per year, it is anticipated that one additional staff member will be added to the isotope program in the next five years.

Within EPA, Region IV, the radiation staff is expected to increase from three to approximately eight during the next five years, according to sources in the Environmental Radiation Section.* Those expected to be added include health physicists, nuclear engineers, a radiochemist, and a technician.

Turnover in the public sector has been low in recent years. Between the State and Federal radiation programs, one to two vacancies have been occurring per year. The annual turnover rate, then varies between eight and sixteen percent.

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* For more information, refer to the Regional report.

As Georgia Power Company adds nuclear units, environmental officials project an increased need for trained staff for environmental radiation control. In the future, each of the two plants will probably employ one health physicist and, at least, one technician, preferably with an associate degree in a related field and an understanding of scientific and electronic principles. The sample-collecting staff would necessarily double to five or six with the addition of the new plant, although these persons would also continue to provide services in areas not related to radiation control.

Because of the increasing usage of radioisotopes in the public sector, sources indicate that needs will increase at this level for experts in the field. As the number of licenses is increasing by approximately 20% per year, estimates have been made that the workforce may increase at a similar rate. Persons working in these capacities will probably continue to require bachelor- or master-level degrees in health physics or nuclear engineering. Turnover rates in the private sector, especially in higher professional positions, appear to be quite low.

According to estimates, then, by 1982, approximately 100 persons will be engaged in activities in the field of environmental radiation control in the public and private sectors, on a full-or part-time basis. This estimate includes seven full-time and thirty part-time employees in EPD, officials at the Georgia Institute of Technology providing program support, approximately six persons in the Department of Human Resources and ten engineers in local health departments, eight at Region IV EPA, approximately twelve at Georgia Power Company, and 20-25 in hospitals, universities, and private consulting firms.

D. Training and Certification

To assist in meeting radiation training needs within the region, EPA Region IV Environmental Radiation Section has established a regional training committee. Georgia State personnel participate in the symposiums that are held two to three times per year, where training voids are determined and plans of action are discussed and acted upon. Outgrowths of these symposiums are courses offered to State regulatory personnel. Georgia personnel have attended both of the two such courses offered since the development of the committee, and administrators plan to continue participation in the future.

Oak Ridge Associated Universities annually offers a ten-week health physics course, which State regulatory personnel attend when needed. In addition, the Nuclear Regulatory Commission offers several courses relating to licensing, inspection, medical isotopes, and general procedures. One such course relating to industrial radiography is held annually in Baton Rouge, Louisiana.

Georgia Institute of Technology offers a degree in nuclear engineering that is geared towards industrial application. Emory University offers a curriculum related to the medical aspects of health physics. Beyond these, courses related to radiation control are not readily available within the State. Related courses at the vocational/technical level have not been identified, except as related to X-ray technology.

E. Career Potential

In the public sector, it appears that health physicists will be in greatest demand, followed closely by nuclear engineers, and, to some extent, nuclear physicists and radiochemists. Two technicians are projected to be added in the public sector in the next five years. Turnover has been very low, so opportunities will probably occur mainly as a result of the creation of new positions.

Health physicists will also be required in the private sector, according to available information, as will nuclear engineers with backgrounds in health physics. A limited number of technicians will be required with science-oriented backgrounds and knowledge of electronics.

The demand for trained personnel will decrease after the early part of the 1980's for the control of radiation from nuclear energy-producing facilities, as no additional plants are planned. However, it is projected that professionals will be in increasing demand indefinitely for the control of radiation from isotopes used in hospitals, medical laboratories, and universities.

F. Conclusion

Increased workforce needs in both the public and private sectors are projected for several reasons: the addition of three nuclear generating units within the next five years, the anticipated increased problem due to the transportation of nuclear materials, and the increasing usage of radioisotopes in hospitals, medical laboratories, and universities. Persons in greatest demand will be health physicists, according to projections.

While upgrade-type training programs are becoming more available, especially for regulatory personnel, curriculums in colleges, universities, and vocational schools are not currently supplying the numbers of professionals required in the State. Because of this, sources requiring these professionals are having difficulty in recruiting qualified personnel. Regulatory agencies appear to have the greatest problems in this area as salaries generally cannot compete with those offered by industries throughout the Region. State agencies also are having difficulty filling needed positions because of State budget limitations. To lessen the impact of these restrictions, these agencies are utilizing field-type personnel for less technical aspects of the work to supplement in-house efforts.

VI. SOLID WASTE

A. Introduction

The Georgia Solid Waste Management Act, enacted in 1972, gives responsibility for regulating solid waste management to the Environmental Protection Division of the Georgia Department of Natural Resources. The Act requires that each of the State's 159 counties and 558 cities complete an approved long-range (10-year) plan for solid waste management, and outlines the requirements that must be followed in preparation of these Plans.

The improper handling of solid waste is declared illegal in Georgia, and any person engaging in solid waste handling (collection, processing and disposal) in the State is required to obtain a permit from the Division. Open dumping, open burning at a disposal site and scavenging at disposal sites are specifically prohibited. Specific requirements are outlined in the Act's Rules and Regulations for the collection and transportation of wastes, for the operation of disposal sites (landfills and sanitary landfills) and for all processing operations (incineration or pyrolysis, shredding, baling, reclamation and recycling and composting).

As of June, 1976, 146 counties and 449 municipalities were covered by plans submitted to the Division. Grants to counties and municipalities are authorized by the Act, for assistance in the construction of solid waste handling. This program is administered by the Environmental Protection Division, and during 1972 the Georgia General Assembly appropriated two million dollars for State Solid Waste Grants-in-Aid during Fiscal Year 1974. A maximum of $50,000 on a fifty-fifty matching basis was awarded to 51 grantees. To be eligible for consideration, the grantee must submit an application which is consistent with long-range plans required by the Act, and must discontinue illegal operation of disposal sites within their jurisdiction. An additional two million dollars was appropriated for Fiscal Years 1975 and 1976. The following depicts activities having taken place from the Act's enactment to June, 1976, according to the Environmental Protection Division.

Fiscal Year 1974:

93 applications for grants received, requesting $3.9 million; 52 grants awarded

52 open dumps were closed

440 roadside dumps were eliminated

26 sanitary landfills were begun

23 rural collection systems were begun

Fiscal Year 1975:

118 Applications for grants received, requesting $4.1 million; 48 grants awarded

40 sanitary landfills begun

27 rural collection systems begun

9 collection systems upgraded

Fiscal Year 1976:

124 applications for grants received, requesting $5.19 million, 46 grants awarded to date

28 sanitary landfills begun

21 rural collection systems begun or upgraded

22 municipal collection systems begun or upgraded

2 transfer stations established

1 paper recycling operation begun

Several counties in the State have conducted feasibility studies regarding resource recovery. It has been found that this type of activity is not feasible except in areas of dense population, which excludes most of the State. The greatest amount of activity of this nature takes place at the industrial level. Through a $75,000 grant from EPA, the Environmental Protection Division established a Resource Recovery Unit, and a industrial waste exchange informational service. The recycling efforts that are carried out in municipalities are usually voluntary programs, which usually recycle aluminum cans, and newspapers. Local interest often wanes, and projects are often short-term in nature.

Hazardous wastes must be dealt with in accordance with a written procedure submitted to and approved by the Division. Several hazardous wastes disposal sites are in operation at the present time, and the Division is concentrating its efforts in this area to an increasing degree. With the passage of the Resource Conservation and Recovery Act of 1976, it is expected that workforce levels devoted to solid waste will increase at the State and local level, and that systems for adequate disposal of hazardous wastes will be upgraded and expanded.

According to Assistant Attorney General Robert Bomar, who represents the Environmental Protection Divison in legal affairs, the State's Solid Waste Management Act provides strong enforcement machinery. Litigation is undertaken by issuing injunctions, exacting civil penalties and initiating misdemeanor actions.

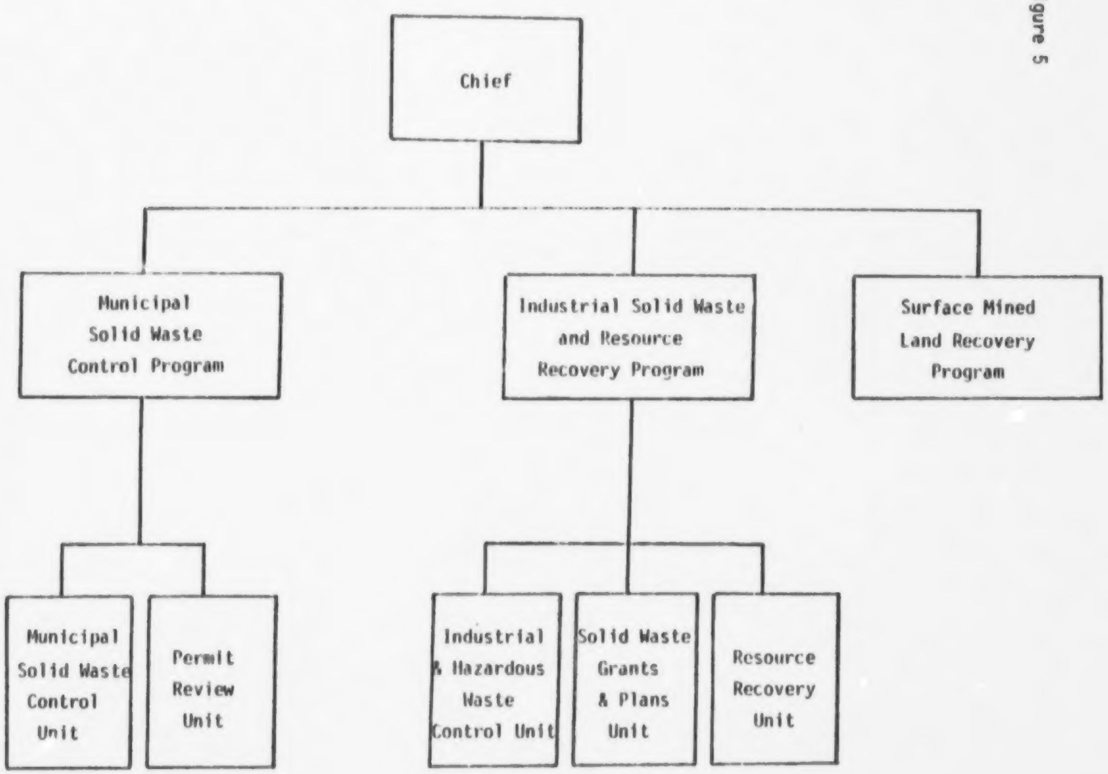
B. Workforce Profile

Chief responsibilities for the implementation and administration of the statewide regulatory program in solid waste management are delegated to the Land Protecton Branch of the Environmental Protection Division. This office has assured implementation of the State's Solid Waste Management Act and the Federal Resource Recovery Act of 1970, and will be responsible for implementation of the Federal Resource Conservation and Recovery Act of 1976. The Branch Chief assesses applicable State and Federal Laws, and proposes changes to improve program implementation. Permits for solid waste handling are reviewed for conformance with existing laws and are coordinated with the air and water programs. The Branch develops and enforces rules and regulations, and is responsible for implementing the permit program.

Two main programs are operated by the Branch: the Industrial Solid Waste and Resource Recovery Program and the Municipal Solid Waste Control Program. The former is responsible for industrial and hazardous waste control, and for providing assistance in the management of all agricultural, industrial, and hazardous materials disposed of on land. Primary responsibility lies in working with industries on in-plant handling to reduce quantities, chemical composition, or other characteristics that will lessen the impact of waste on disposal site operation. Guidelines are developed for specific categories of waste, detailing storage, transportation, processing and disposal requirements. In addition, the State resource recovery and recycling program is administered by this Program. Activities relate to the recycling of waste materials, the development of markets for recycled products, the modifications of State purchasing specifications to increase recycled content, and the removal of artificial and inequitable

Figure 5

GEORGIA ENVIRONMENTAL PROTECTION DIVISION
LAND PROTECTION BRANCH


Chief
Municipal Solid Waste Control Program
Industrial Solid Waste and Resource Recovery Program
Surface Mined Land Recovery Program
Municipal Solid Waste Control Unit
Permit Review Unit
Industrial & Hazardous Waste Control Unit
Solid Waste Grants & Plans Unit
Resource Recovery Unit

barriers between recycled and virgin products and natural resources.

The Municipal Solid Waste Control Program is responsible for providing assistance to counties and municipalities in the development of long-range plans, in the development of new facilities, and for bringing existing facilities into compliance. This Program also investigates existing disposal sites and plans for proposed facilities, and is responsible for the issuance of permits.

The Program Coordination Branch of the Environmental Protection Division provides administrative and field services to the solid waste program. Four Regional offices are in operation: North Georgia, Middle Georgia, Southeast Georgia and Southwest Georgia. The Branch compiles work plans prepared by the air, land and water protection programs and delineates work to be done by each region. The Branch remains familiar with all rules administered by the Division and reviews enforcement requests from the regional offices for conformance with these rules.

Staffing levels committed to solid waste activities within the Environmental Protection Division appear as follows:

TABLE XIII

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Solid Waste Management
Current (1976) Staffing Level

Position	1976
Land Protection Branch	
Engineer	14
Scientist (degreed)	12
Other[1]	5
Program Coordination Branch	
Engineer	2
Scientist (degreed)	2
Other[1]	1
TOTAL	36

[1] Secretaries

The engineers that work in solid waste management programs come mainly from civil and chemical backgrounds, with some from mechanical and industrial backgrounds. All persons in the "scientist (degreed)" category are in the State classification of "Environmental Specialist". Few of these specialists have solid waste or environmental backgrounds, but represent a variety of disciplines such as chemistry, entomology, geology, and industrial hygiene. One specialist has a degree in environmental health. Two of the 36 positions, an engineer and a specialist, are supported by federal funds. Numbers and types of positions have remained completely stable within the past year.

As of June, 1976, there were 580 active disposal sites in the State. It is estimated by Branch officials that 95% of the active sites are served by one operator, with the remainder having two or three. Based upon these assumptions, there are approximately 600-620 persons engaged in solid waste disposal activities in the State, and most are engaged in direct landfilling. The development of a certification program for landfill operators is being contemplated within the Division, as it is felt that this type of process leads to better training, higher pay for operators, and more public respect for the profession. More accurate figures would also be obtainable regarding the workforce involved.

Most industries in Georgia do not have persons on staff with expertise in industrial solid waste management, although a great need exists at this level, according to the director of the Land Protection Branch. There are fifteen to twenty consulting firms in the State that provide technical services to industrial and municipal operations, although only five or six of these, which are national in scope, are felt to have any real expertise in the field. Most efforts of these companies to date have been in the development of feasibility studies.

In Dalton, Georgia, there is a private facility called Southeastern Waste Treatment that aids industries in northwest Georgia and portions of surrounding states in the handling of liquid wastes. This facility is a coagulation-filtration plant that treats primarily latex, which is an adhesive used by the carpet industry in the area. At the facility, the latex material is separated by an emulsion process, coagulated and filtered. The water is separated from this solution to produce a solid cake which can be handled by sanitary landfills. The plant currently employs ten people in the Dalton area, excluding the plant director and the plant officers. These personnel are primarily blue-collar types, who look after plant maintenance and drive trucks. Plant processes are performed automatically.

U.S. EPA Region IV is located in Atlanta, Georgia. During 1976, four engineers and one scientist worked in the field of solid waste.

C. Workforce Projections

Large increases are expected at the State level in view of the recent passage of the Federal Resource Conservation and Recovery Act of 1976. While activities currently taking place will continue, increased emphasis will occur in the areas of industrial hazardous waste disposal and resource recovery. Specific plans, however, cannot be finalized until Rules and Regulations and funding levels are developed at the federal level. While numbers of positions are expected to increase, the types of backgrounds represented are not anticipated to change appreciably, although a slightly greater increased need may occur for chemical engineers than for other professional areas.

The following table depicts future growth within the State solid waste program, as projected by administrators in the Environmental Protection Division:

TABLE XIV

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Solid Waste Management
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	13	14	18	21	24	26	10%	15%
Scientist	17	18	22	26	27	28	5%	11%
Other	6	6	8	9	10	10	5%	11%
TOTAL	36	38	48	56	61	64		12%

Turnover rates are highest for engineers, as these persons are currently in demand with private consulting firms, city governments, and the federal government, which all offer higher salaries than the State. "Environmental Specialists" are very easy to recruit, and the Division obtains at least three to four applications for every vacancy. Thus, turnover for this position is quite low.

Also because of the new Act, U.S. EPA Region IV expects to increase its staffing level from five to thirty in the next three years. New positions projected to be added include engineers, scientists, a grants coordinator and secretaries.*

Needs for larger numbers of landfill operators are not anticipated within the next five years, according to State personnel, as consolidations of sites are being implemented. The total number may remain fairly constant, although shifts will occur whereby one will see a need for more personnel with expertise in the areas of resource recovery and hazardous waste management.

* For more detail, refer to the Region IV report.

As resource recovery activity increases, persons will be required, especially in larger urban areas, for all aspects of the work. High level administrative officials will be needed, as well as economists, plant managers (probably engineering technicians) and skilled laborers. Needs for persons with expertise in resource recovery are already found in the industrial sector, and are expected to grow. In the area of hazardous waste management, State professionals anticipate an increasing need for trained equipment operators, and chemists to perform analytical work, and to determine the needed treatments.

Turnover is currently very high for landfill operators, according to State personnel. To a large extent, this is because heavy equipment operators can make nearly twice as much money working in road construction crews rather than in landfills.

The president of Southeastern Waste Treatment is currently negotiating with the metropolitan Atlanta area to locate a treatment facility in that area for handling industrial liquid wastes. A need exists for this type of facility, as landfills in the fifteen-county area surrounding Atlanta are to be closed to liquid waste. Proposed for construction is a comprehensive waste treatment plant based around a fluid bed incinerator to be built in the Atlanta area within the next two years. The proposed facility will be capable of burning one and a half million tons of waste material per month, and industries in all of Georgia and part of Alabama will be able to utilize the service.

The operation will be designed to handle all organic waste materials, but not radioactive wastes. Examples of industrial wastes to be burned include paint sludges, wood processing wastes, and oil sludges. The plant's incinerator will generate energy as a byproduct, up to one hundred million BTU's per hour, to be sold to Atlanta industries. This proposed operation would then provide two services to the State: the handling of liquid waste materials, and contribution to the energy supply, lowering the region's dependence upon fossil fuels and natural gas. It would be one of the first of its kind in existence.

The proposed facility will employ approximately twelve persons. This includes a sales force of two persons who are knowledgeable in the Atlanta waste market, a plant manager, preferably a chemist to blend reactions for the proper waste content, and a crew of nine with basic mechanical/electrical understandings to maintain the facility. These latter people should have had experience as either power plant or boiler operators.

Industrial and hazardous wastes are a significant problem in the State, especially in the southern portion. In this area, the water table is very high, making landfilling hazardous to water supplies. If the new facility is built, it will be able to handle nearly all industrial wastes, but its construction is mainly contingent upon the money available.

D. Training and Certification

The new employees that are hired to work in solid waste programs participate in the rotational program, whereby new entrants spend time working in each of the Division's programs, for a total of six months. One person per year also participates in the 100% stipend program sponsored by the Environmental Protection Division. This individual may attend graduate school anywhere in the country to obtain a master's degree in a related area.

Solid waste personnel attend EPA technical courses, as well as those sponsored by engineering coroporations. Between July 1, 1975, and June 30, 1976, seventeen programs were attended, with a total of 47 participants, 199.5 course hours and 463.5 participant hours. During each fiscal year, all non-supervisory personnel attend two employee development courses offered by the State Merit System. Supervisors participate in intensive management training co-sponsored by the University of Georgia and the State Merit System. Six levels are offered, with the ultimate goal of each person's becoming a "certified public manager". As this program, which is offered to all State agencies, is recent in its development, no certification has yet taken place.

The Environmental Protection Division cooperates with the University of Georgia in offering a one-credit-hour environmental seminar each winter quarter. Ten to twelve classes are held, each one hour in duration. One of these hours is devoted to solid waste management, and one hour to resource recovery. The Land Protection Branch also cooperates with Shorter College and Valdosta State College, in offering solid waste training. In addition, a "Teachers Environmental Technical Institute" (TETI) is sponsored by Georgia Southern College and Union Camp Corporation, with which the Branch cooperates, for teaching teachers in environmental matters.

The Branch also offers several "canned courses":

1) "Operation Responsible" - safety training for collectors.
2) "Elements of Solid Waste Management" - for city and county officials
3) "Sanitary Landfill Supervisors Seminar"
4) "Sanitary Landfill Operations Seminar"

The following table depicts the formal training offered during Fiscal Year 1976 by the Land Protection Branch:

TABLE XV

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Solid Waste Training Offered During FY 1976
Land Protection Branch

	Title	No.Hours	No.Times Taught	No.Students
1.	Sanitary Landfill Operations Seminar	7	1	13
2.	Insect and Rodent Control for Sanitarians	4	1	9
3.	Principles of Solid Waste Management for Sanitarians	2.5	1	9
4.	Operation Responsible	2	1	17
5.	Resource Recovery	7	1	37
6.	Fernbank Science Center Youth Conservation Corps	7	1	21
7.	Recycling for Sanitarians	1	1	9
8.	Voc. Ag. Teachers Workshop	1.75	1	20
9.	Organization of EPA - to Environmental Health Seminar	1	1	32
10.	General Solid Waste Management to Environmental Health Seminar	1	1	32
11.	Organization,Laws,Rules and Regulations to Environmental Health Seminars	.5	1	32
12.	Recycling-to Environmental Health Seminar	1	1	32
13.	Solid Waste Grant-in-Aid Guidelines Seminar	2	4	101
14.	TETI-Georgia Southern	1	1	25
	TOTAL	38.75	17	389

Region IV EPA solid waste personnel have formed a Regional Training Committee for critiquing training needs and for providing appropriate training. State solid waste directors are members of this Committee, and State personnel attend training that is offered. The first course was held in November, 1976, in Atlanta on "Elements of Solid Waste Management." Future courses will be more in-depth, and based on State recommendations.

The Land Protection Branch assists in training Region IV EPA's new solid waste personnel. On-the-job training is provided, and two persons in the past year have been assigned to work in the Branch for a period of three months each.

Presentations are offered to various clubs and organizations within the State by the Land Protection Branch. During Fiscal Year 1976, 39 such presentations were conducted, according to Division records, reaching a total of approximately 2,500 persons.

E. Career Potential

Because of the recent passage of the Federal Resource Conservation and Recovery Act, solid waste workforce levels are expected to grow in the Environmental Protection Division. Types of personnel added will remain similar to those already on the staff, i.e., engineers and specialists. Some additional need for chemical engineers in the area of hazardous waste management, may develop and those who have had course work in solid waste management, though they are rare, will be sought. Specialists with previous training in environmental program management are preferred, although this type of training is not readily available, and persons with degrees in such areas as biology, geology, chemistry, and entomology will probably continue to be utilized.

The number of landfill operators is not expected to increase in the next five years, due to efforts toward the consolidation of sites. However, new jobs are expected to develop in the fields of resource recovery and hazardous waste management. As resource recovery becomes available, in large metropolitan areas high level administrative officials will be required, as well as engineering technicians for managing plants. In addition, economists will probably be in demand for this type of operation, as well as will skilled laborers.

State, industrial and local personnel will also become much more involved in the field of hazardous waste disposal. Increased needs are projected for chemical engineers, chemists, and skilled equipment operators.

F. Conclusion

The Environmental Protection Division is responsible for implementation of all regulations stemming from Georgia's Solid Waste Management Act. The Act requires developing long-range solid waste plans by all cities and counties, and requires that all engaged in solid waste handling obtain a permit from the Division. The Land Protection Branch holds chief responsibilities for the State's program, and is expected to grow as a result of the passage of the Federal Resource Conservation and Recovery Act of 1976. An average annual 12% increase in staffing level is projected over the next five years. Current functions will continue, but increased emphasis will take place in the areas of resource recovery and hazardous wastes. As few educational course-work opportunities exist at the undergraduate or graduate level, the Branch anticipates hiring engineers and specialists without prior solid waste training, and providing the necessary training. Under present circumstances, few problems arise with this system, but as the field grows increasingly technical, the lack of institutional programs may be more acutely felt.

While the number of landfill operators is not expected to grow, increasing expertise will be required at the local level to carry out programs to be implemented under the new federal Act. Training available for landfill operators is presently almost nil, except for general heavy equipment operations training programs. Turnover among landfill operators is presently very high, as pay is extremely low. State officials strongly believe that a certification process coupled with the needed training programs could help raise the prestige and salaries within the profession, while providing individuals with the expertise that will be required to increasing degrees as the new Act is implemented.

VII. WASTEWATER

A. Introduction

The Georgia Water Quality Control Act, passed in 1964 and amended in 1971 and 1974, created a Water Quality Control Board for exercising supervision over the administration and enforcement of the Act and its Rules and Regulations. The Board consists of nine members, one each from the following areas: Department of Public Health, soil and water conservation, municipal government, commerce, agriculture, industry, recreational, county government and the public at large. Implementation of the Act's purposes is carried out by the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources.

The Act requires that no person may construct, modify, install or operate any facility that would result in point or non-point discharges into the waters of the State without first obtaining a permit from the EPD. The Act authorizes the State to make grants to counties and municipalities to assist them in the construction of those portions of water pollution control projects that qualify for federal aid. The Board is responsible for receiving and allocating all federal funds appropriated to the State from the federal government.

According to Assistant Attorney General Robert Bomar, Georgia's water quality legislation provides strong enforcement machinery, carried out by the issuance of civil penalties. Georgia early obtained authority for NPDES permitting, and every discharger currently employs secondary treatment measures.

In April of 1976, a report entitled Water Quality Control in Georgia, 1975, was published by the EPD and submitted to EPA in accordance with Section 305 (b) of P.L. 92-500. The report concluded that most of Georgia's waters were of good quality and that a significant reduction in water pollution had been accomplished in recent years. The report estimated that approximately $76 million in public funds were obligated for water pollution control facilities in Georgia in 1975, and that industry had spent over $225 million since 1965 for water pollution control. Non-point source pollution control is currently a major concern in the State, to be dealt with through Section 208 areawide planning.

The Certification of Water and Wastewater Treatment Plant Operators Act of 1969 provides for mandatory certification of wastewater treatment plant operators. The Act authorized a Board of Examiners to carry out its purposes, which classified all plants on the basis of size and complexity, and mandated that chief operators be certified at the level of the plant. The Board prepares and conducts examinations, and issues certificates.

B. Workforce Profile

Functions relating to wastewater pollution control take place in both the Water Protection Branch and the Program Coordination Branch of the EPD. Within the Water Protection Branch, wastewater activities are concentrated in five Programs, as follows:

> Municipal Wastewater Program: Responsible for requiring adequate treatment of all municipal wastewater treatment dischargers and the development, processing and certification of applications for matching federal grant funds for the construction of municipal wastewater treatment facilities as authorized by P.L. 92-500. Issues NPDES permits to municipal facilities.
>
> Industrial Wastewater Program: Responsible for requiring adequate treatment of all non-municipal dischargers, including industrial, commercial and privately-owned facilities. Issues permits to these facilities and performs the compliance, monitoring and enforcement efforts associated with the permit requirements.

Water Resource Management Program: Responsible for efforts related to the statewide water quality continuing planning process. This includes preparation and maintenance of Section 303(e) strategies for the 15 basins in the State, coordination with designated 208 planning efforts and development of state 208 plans for non-designated areas.

Water Quality Support Program: Responsible for operating the programs for ambient trend monitoring network for streams, wastewater treatment impact surveys and studies, special stream self-purification capacity surveys and modeling studies. Also operates an aquatic biology laboratory.

State Grants and Operator Training Program: Responsible for the administration of the state grants program for the construction of water supply and wastewater treatment facilities and the coordination and provision of the training program for the water supply and wastewater treatment plant operators.

The Program Coordination Branch supports the water quality program through its regional offices program and through its Water Quality Laboratory. Wastewater personnel are located in each of the Branch's regional offices (in Atlanta, Macon, Brunswick and Albany), and staff perform functions which conform with the goals of the Water Protection Branch. The Water Quality Laboratory performs all of the proper analytical services required for enforcement, and personnel appear as expert witnesses in legal proceedings as needed.

In the Water Protection Branch, 89 persons work in pollution control: one branch chief, one section chief, six program managers, one unit coordinator, 41 engineers, 20 specialists, four technicians, one training officer, one draftsman, one grants coordinator and twelve clerical employees. The Program Coordination Branch budgets the following positions to wastewater: one program manager, two engineers, six scientists, five specialists, one data entry clerk and three clerical employees.

Engineers come mainly from civil and sanitary backgrounds, while specialists are degreed persons, specifically in biology or chemistry for the most part. Environmental scientists are required to have degrees in chemistry, biology, microbiology or bacteriology. One technician is a co-op student, while the remainder have high school educations and experience in the field.

Most employees are hired through the State Merit System. Engineers, however, are often not listed on the System's register, so each winter and spring, Water Protection Branch personnel visit universities with graduating students in an effort to get more names of qualified persons on the register.

The following table depicts the total numbers of persons in the Environmental Protection Division currently working in the area of wastewater pollution control:

TABLE XVI

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

Wastewater Program Operations
Current (1976) Staffing Level

Position	1976
Engineer	43
Scientist	31
Technician	4
Other	29
TOTAL	107

* Includes administrators and technical support, training and clerical personnel

As of June 30, 1976, there were 1,247 active certificates for the operation of waste treatment facilities in the State. Of interest is the fact that this number is identical to the number of certificates issued to water treatment plant operators at that time. Administrators indicated that this situation is coincidental. Operators-in-charge of treatment plants are classified in categories I through IV according to the plants they operate. Other operators need not be classified at the level of the plant, but must be certified. Class I is the highest level.

The following table depicts the current number of active certificates, by category:

TABLE XVII

STATE OF GEORGIA

Certified Wastewater Treatment Plant Operators
Current (1976) Staffing Level

Classification	1976
I	72
II	309
III	672
IV	194
TOTAL	1,247

It should be noted that some operators hold certificates in more than one category, so that numbers of active certificates are not the same as the numbers of persons certified. Therefore, the number 1,247 is necessarily somewhat larger than the actual number of operators.

The State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators completed its second Municipal Operator Certification Survey during 1976. This survey led to a large number of municipalities obtaining compliance with the Certification Act and Rules of the Board. The survey revealed that 1,061 operators were employed at municipal wastewater facilities, of whom 856 were properly certified. Even though a number of municipalities were found not to be in compliance, officials of most of those agreed to obtain compliance as soon as possible.

Information concerning the numbers of persons working in wastewater treatment plants is not readily available. However, in 1968, the Georgia

Department of Labor, Employment Security Agency, conducted a survey which provided current workforce profiles and projections for 1970 and 1973. Although this data is out-of-date, and the field has grown appreciably since that time, one could utilize the known number of active certificates issued, which is relatively close to the actual number of certified operators, and its growth pattern, and make estimates regarding the current levels of all other personnel. According to administrators within the Water Protection Branch, this method might offer some reliability, although the number of laboratory technicians has probably increased during this period more than for other personnel. Accordingly, the following table depicts 1968 workforce levels, as provided by the Georgia Department of Labor, and current workforce estimates, based upon available data.

TABLE XVIII

STATE OF GEORGIA

Wastewater Treatment Plants and Sewer Systems
1968 and Estimated 1976 Staffing Level

Position	1968	1976 (est.)
	Treatment Plants	
Professional		
Administrative	22	80
Engineer	11	40
Chemist	7	25
Other	7	25
Supervisor (non-operator)	38	138
Technician		
Laboratory	10	43*
Electrical	11	40
Aide	12	43
Operator	344	1,247
Unskilled	157	569
TOTAL	619	2,250

*Computed as others, plus 20%

TABLE XVIII (Cont'd)

Position	1968	1976 (est.)
	Systems (Other than Plants)	
Professional	39	141
Technical	97	352
Skilled	327	1,185
Unskilled	519	1,849
TOTAL	982	3,527
GRAND TOTAL	1,601	5,777

It should be kept in mind that activities in relation to wastewater in the State also take place at U.S. EPA Region IV, located in Atlanta and Athens.* In 1976, there were approximately 248 persons employed in wastewater. At the regulatory level, then (Federal and State) in Georgia, currently approximately 355 people are servicing the field. EPA also operates an Environmental Research Laboratory at Athens, in which many research activities relate to wastewater.* The total current overall staffing level for full-time permanent employees is 74.

There are three designated areawide planning agencies authorized under Section 208 of 92-500. They are:

Chatham County-Savannah Metropolitan Planning Commission
Macon-Bibb County Planning and Zoning Commission
Atlanta Regional Commission

A fourth, located in Chattanooga, Tennessee, includes several Georgia counties in its planning efforts. Staffs for this type of planning tend to be quite small, and most work is conducted by contracting to other agencies and consulting firms.

Private consulting firms also provide services in the design and construction of wastewater treatment facilities. Specific numbers, however, are not directly available, although EPD officials indicate that no shortage exists at the present time. Large industries employ their own engineers for design and assurance of ongoing operation.

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*For more information regarding such activities, refer to the appropriate reports.

C. Workforce Projections

Workforce projections for wastewater activities within the Environmental Protection Division and for statewide operations personnel are based upon the best professional judgments of administrators within the Water Protection Branch. These administrators have indicated that for Fiscal Year 1977, four new positions have been applied for, and hopefully will be added to the water quality program. These positions include two technicians, one scientist and one engineer. Five-year projections provide for an increase of 41 additional positions in the same type categories that are presently staffed. The number of technicians might increase to a greater extent than for other positions, but will partially be filled with temporary engineering co-op students. Projections are based upon anticipated Federal and State appropriations which allow expansion of existing programs. Administrators stressed that figures are estimates.

Based upon the above information, the following depicts projected workforce levels within the Environmental Protection Division:

TABLE XIX
GEORGIA ENVIRONMENTAL PROTECTION DIVISION
Wastewater Program Operations
Workforce Projections to 1982 (est)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	43	44	48	52	56	58	10%	6%
Scientist	31	32	35	38	41	43	5%	6%
Technician	4	6	8	10	13	15	5%	30%
Other	29	29	31	33	35	36	6%	5%
TOTAL	107	111	122	133	145	152	6%	7%

Turnover rates are estimated at 10% for engineers and 5% for all other positions. Engineers are currently in greater demand, and can most easily find lucrative positions with private industry, consulting firms or the federal government.

Substantial increases are projected in EPA Region IV water quality programs. New positions would include geologists, toxicologists, planners, contract auditors, chemists and technicians. These increases projected for EPA water quality programs are attributed to Section 208 program management needs, increased activity related to underground injection control, increased monitoring and field work in relation to toxicants, and analytical laboratory needs. Additional personnel are also required for NPDES permitting.

Based upon the number of wastewater treatment plants being constructed, expanded and upgraded, coupled with stricter enforcement of the certification law, EPD administrators project a need for 1,000 additional certified operators over the next five-year period. The proportions of operators in categories I through IV are expected to remain similar, although a slightly greater increase may occur at the levels I and II because plants are becoming more complex, requiring operators with higher skill levels.

Assuming that growth will occur at a constant rate over the next five years, and that the skill level will demonstrate an upward shift, the following table depicts estimated projections for certified water treatment operators, based upon available information:

TABLE XX

STATE OF GEORGIA

Certified Wastewater Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum growth (average)
I	72	103	133	164	194	225	26%
II	309	382	455	528	601	674	17%
III	672	758	844	929	1015	1101	10%
IV	194	205	215	226	236	247	5%
TOTAL	1,247	1,448	1,647	1,847	2,046	2,247	13%

*Current numbers reflect the numbers of active certificates.

Effort has not been made to provide specific projections regarding the workforce in wastewater treatment plants for employees other than operators, as the data base is itself an estimate. However, it appears that the needs for other personnel may increase at a similar or slightly lower rate than for certified operators. The number of chemists and laboratory technicians, both in and out of treatment plants, however, should increase proportionately to the number of certified operators, as testing requirements become more stringent under the Federal Act, and as procedures become more complex. Since, in many instances, operators have conducted the needed analyses, new specialized personnel may be hired to perform these functions. Industries and municipalities will find increased need for engineers as requirements become more stringent and as new treatment units are added to plants. These engineers may be added to industrial or municipal staffs or contracted from private consulting firms. EPD officials estimate that a 10-25% increased usage of engineers will occur over the next five years.

Few data are available regarding turnover rates within treatment operations. Indications are that the turnover rate declined sharply after the mandatory certification law came into effect, and the workforce was upgraded through training processes. It is expected that rates should decline further as salaries are continually upgraded as skills increase.

In sum, at the regulatory level, an average annual increase in workforce of 6% is projected over the next five years. Workforce growth within the Athens Laboratory is projected to be smaller, approximately 3% annually. Within these agencies, the numbers of engineers, scientists and technicians will increase, as forecasted. The number of certified operators is projected to nearly double to over 2,000 and supporting plant personnel will also increase in numbers. Increased engineering requirements are also projected for the design of new facilities.

D. Training and Certification

All new entrants into the water quality program participate in EPD's rotational program, whereby they spend time in each of the Division's programs over a period of approximately six months. In addition, technical conferences and short courses are utilized by the Water Protection Branch for training purposes. Most short courses attended are sponsored by EPA, although some are carried out by universities. Wastewater personnel are also eligible to attend courses offered by the Georgia Merit System; administrators participate in management training, while others may attend employee development courses. The EPD also offers a graduate stipend program for professional personnel, and wastewater employees are eligible.

Training for wastewater treatment plant operators is coordinated through the State Water Grants and Operator Training Program within the Water Protection Branch. At the present time, three types of training programs are being carried out, which are as follows:

1) Georgia Water and Wastewater Institute: This program moved from South Georgia Tech at Americus to West Georgia College in Carrollton on March 1, 1976. The EPD contracts with the college to provide the instructors and the services. Two full-time instructors are on the staff, and one secretary, although outside consultants and EPD staff member occasionally assist in training. Courses are scheduled for six months at a time, and include classes in wastewater, surface water and groundwater. There is no charge for these courses, which are designed for those already in the field and for those wishing to enter it. Enrollment is limited to twenty per six-month course schedule. Since the facility moved to Carrollton, there has been an absence of laboratory classes. At the present location there is not adequate space for the equipment. The laboratory equipment is now in storage, and EPD plans to build a laboratory facility on campus, although completion will be at least a year away.

2) Coupled On-The-Job Training Program: This program is a mixture of formal and on-the-job training, and participants are both entry-and non-entry level. These courses are carried out by one full-time and one half-time instructor in various vocational schools throughout the State. Classes are held one day every other week, and between class days, instructors visit students at their work sites. The course lasts six months, with 104 classroom hours and 35 hours of on-the-job training offered to each participant. EPD tries to limit class sizes to 20, but have reached nearly 40. Normally two courses are held each year, although four were held in 1976 due to the receipt of special impact funds that are specified to go to minority schools.

3) Spring and Fall Short Course School: The EPD and the Georgia Water and Pollution Control Association sponsors short courses twice a year, in the spring in the northern part of the State, and in the fall, in the southern portion. Courses, which are held on college campuses, last four days, and are taught by instructors from educational institutions, by EPD staff, by municipal officials and by consulting firms. All instructors donate time and services. Classes do not vary widely from year to year, and cover surface water, groundwater and wastewater. Five courses are held at one time, and attendance is limited to 65 for basic courses and 35 in advanced courses. Approximately 200 attend each session, all of whom must be members of the Association.

EPD officials estimate that 800 people receive training each year in these three programs, which constitute at least 95% of all training conducted in the Division. It is estimated that 1,000 will have to be trained each year (in both water and wastewater operations) to meet the demands of new personnel and upgrade. The State can accommodate this many with an expansion of the existing program. However, EPA is partially supporting the Coupled OJT program, and future funding is in jeopardy. If federal funding is not continued for this program, the State will not be able to meet its requirements.

There are currently no vocational or technical schools in the State that offer training for water or wastewater plant operators. Vocational schools in Savannah and Atlanta have previously offered courses, but recruitment of trainees had proven to be a problem. The vocational school in Brunswick, Georgia, may develop courses, but any training program must be approved by the State Board of Certification before graduates are eligible to be tested for certification.

In sum, the State hopes to continue the current training programs, although efforts will increase during the next five years because the State is putting pressure on municipalities for operators to be licensed according to the law. In addition, an update of the Rules of the Board recently specified that Class I operators will have to attend training every two years to renew their certificates. However, actual follow-through on this will not begin until July 1, 1979. If a vocational school implements an approved program, the EPD may be able to slightly slacken their efforts in the training area.

E. Career Potential

Engineers, especially civil and sanitary will be continually utilized at the State level and at U.S. EPA Region IV and at the Environmental Research Laboratory. At the present time, these persons are difficult to recruit. Scientists, too, will continually be utilized, and a growth in numbers is also projected. A growth in the number of technicians is projected at these agencies, utilizing persons with associate degrees, and at the State level, engineering co-op students. EPA Region IV will require more planners, contract auditors, and scientists in the area of toxicology and geology.

For the operation of wastewater treatment facilities, a large increase, or nearly doubling in the number of certified operators is projected, and needs for laboratory personnel will occur. As plants become increasingly complex, demands will occur for more highly skilled personnel. As this process may at least partially occur through upgrade, opportunities will be available for entry level operators. Increasing needs for engineering capabilities are also forecasted for wastewater plants until requirements of PL 92-500 are met.

F. Conclusion

Georgia currently operates its water quality control program under the authority of the State's Water Quality Control Act, which authorized programs similar to those authorized under the Federal Act, and the State currently operates its own NPDES permitting program. For continued maintenance of ongoing programs, EPD officials project that staff growth will be needed. Coupled with career opportunities at federal environmental organizations in the State, career prospects in the public sector appear fairly bright in the field of wastewater. At the operations level, dramatic personnel increases are forecast, especially for certified operators and laboratory technicians, and somewhat less so for engineers. For operators, an upgrading of skills will be required due not only to more stringent enforcement of the State's mandatory certification law but also to the new construction, expansion, and upgrade of facilities.

In order to supply the necessary number of trained and certified operators, EPD estimates that it will have to train approximately 1,000 new entry and on-line operators of water and wastewater treatment plants, approximately 20% above its current level. At the same time, federal funds may be discontinued for one of its major training programs. However, if this funding is continued, it is expected by EPD that it will be able to expand its current efforts to accommodate the needed number of students.

VIII. ENERGY

A. Introduction

For its energy supply, Georgia has in the past relied chiefly upon the use of coal, and also upon imported oil and gas. One nuclear generating unit is currently in operation, one is under construction and two more are planned. Some coal mining is carried out in the State, especially in the northern portion, and speculation is occurring in the Federal and State governments that reserves of oil and gas may exist on Georgia's outer continental shelf.

In April, 1976, House Bill 1698 was approved by the Georgia General Assembly, and was subsequently signed by the Governor. The Act declares: "The planning, development and management of Georgia's energy resources while protecting the economic, social and environmental values of her citizens requires expanded authority and capability and a unified, coordinated response within State government". Further, the Act declares it to be public policy of the State to ensure energy conservation and efficiency, to ensure wise management and development of traditional energy resources, and to ensure the development and placement into the market place of viable energy resources for the purposes of providing an adequate energy supply, economic prosperity, and a safe environment.

An advisory council, the Georgia Council for Energy Resources, was created by this Act, consisting of thirteen members, as follows: The Director of the Office of Planning and Budget (Chairman), the Commissioner of the Department of Natural Resources, the Commissioner of the Department of

Transportation, the Chairman of the Public Services Commission, the Commissioner of the Department of Agriculture, the Commissioner of the Department of Revenue, the Vice President for Research of the University of Georgia, the Vice President for Research of the Georgia Institute of Technology, one member of the House of Representatives, one member of the Senate, and three individuals from the public at large.

The Council was given the following responsibilities:

1) To evaluate and assess State energy policies and their impact upon the economy and the environment and make recommendations to the Governor and the General Assembly.

2) To encourage the cooperation of Federal, State and local agencies in the promotion and attainment of the purposes of the Act.

3) To enlist the cooperation of public utilities, civic and community organizations, industrial and commercial organizations, labor organizations and other identifiable groups in order to develop and implement programs which further the purposes of the Act.

4) To recommend actions which would assist in eliminating duplication of effort among governmental departments and agencies involved in energy activities.

5) To recommend to the Governor actions needed to accomplish the purposes of the Act.

The Georgia Office of Energy Resources was established by the Act within the State Office of Planning and Budget. This Office was given sole authority and responsibility for the Administration of the Act. Among the functions delegated to this Office are the following:

1) To monitor and assess the relationship and impact of international, federal, and regional energy policies on the State's energy policies and programs.

2) To collect and analyze data relating to past, present and future consumptive levels for all sources of energy, and to provide recommendations.

3) To prepare a standby emergency plan for energy shortages.

4) To design and implement a program to encourage energy conservation and efficiency.

5) To maintain awareness of all energy-related research.

6) To solicit funds for purposes relating to energy conservation and efficiency, alternate energy technologies, or other appropriate energy-related areas.

B. Workforce Profile

With the adoption of the Act, a director of the Office of Energy Resources (OER) was appointed, and funds were provided for a twelve-member staff. About one-half of OER's budget comes from federal funds. According to the director, a deputy director will be hired, preferably with a political science background, with experience in government administration or communications. Two sections will be formed: Planning and Development and Program Operations. For the former section, persons with master's degrees in urban planning with related field experience will be sought for planning with regard to State policies. Research assistants will also be required to perform data collection and review of State legislation. Support will also be provided from a person with a background in statistics or computers. Finally, persons with political science backgrounds will be sought for this Section. The Program Operations Section will implement energy programs. Persons with broad educational/experience bases will be sought, perhaps with backgrounds in government administration or management.

The Director of the Office anticipates that the OER will be concerned more with searching for new energy resources and promoting energy conservation and efficiency than with fuel allocations, as the State had done in the past. One of the agency's immediate goals is convincing the Federal government to locate its proposed Solar Energy Institute in Georgia.

The OER does not have supervision over Georgia's planning input for outer continental shelf oil exploration. The Office of Planning and Budget has a staff member who will work in this area with OER and federal agencies to help plan the State's role in future petroleum drilling off Georgia's coast.

The State Economic Opportunity Office of the Georgia Department of Community Affairs is also concerned with energy conservation. This office coordinates low-income housing weatherization projects through the allocation of Federal funds to Community Action Agencies in every county of the State. These funds stem from the Federal Community Services Administration and were supplemented with Title X funds from the Economic Development Act. Besides weatherization projects, these agencies provide crisis intervention, transportation, alternate residency, and consumer education for the poor, near-poor, the elderly and the handicapped in relation to fuel and energy shortages. How these services are provided is left up to each particular agency, but in all cases, the services are performed by the agencies themselves, utilizing volunteers from civic groups or other local people. In some cases, prisoners have been provided carpentry classes, and perform various weatherization services. Weatherization techniques include insulation, caulking and weather stripping. Kerosene and wood are also provided to those in need of heat. Within the past year-and-a-half, approximately 6,000 homes have been weatherized.

The Institute of Ecology at the University of Georgia accepts grants in non-applied areas of ecology and pollution. The Institute receives money from the Energy Research and Development Administration to conduct a research project at the Savannah River Plant in South Carolina relating to the effects of radiation on the environment. Also in the University of Georgia is the Office of Energy Research, a loosely-knit group that conducts applied research in the field of energy. The group is currently carrying out two grants, relating to solar energy and bio-conversion. The Institute of Government at the University conducts workshops and seminars for all levels of government on a wide range of topics, and may in the future conduct workshops relating to energy conservation and efficiency. Finally, the Cooperative Extension Service at the University provides assistance to farmers in reducing energy consumption and in searching for alternate sources of energy.

The Engineering Experiment Station (EES) at the Georgia Institute of Technology is involved with applied technological research in the fields of both energy and environmental concerns. Specifically, the EES is involved with energy research in the area of solar energy and material development. During the recent year, the EES has principally been involved in three projects: 1) the development of materials that will withstand high temperatures of solar energy collectors, 2) development of solar boilers, and 3) development of solar storage units. In addition, the EES developed five smaller energy projects.

The Georgia Institute of Technology has recently unveiled a proposal to build a solar power plant with five acres of solar collectors, which would meet the school's entire energy needs. This proposal has been submitted to the Energy Research and Development Administration (ERDA) in Albuquerque, New Mexico, and the plant would be the largest of its kind. If approved, the cost of the project would be shared by the Institute, Georgia Power

Company and ERDA. One solar energy plant is in use in Georgia at an elementary school in Atlanta and another is under construction south of Atlanta.

In 1975, the Georgia Institute of Technology contracted with the Southwest Georgia Area Planning and Development Commission and the Atlanta Regional Commission (ARC) to prepare program designs for substate energy management and conservation plans. The Southwest Georgia area is basically a rural area and the Atlanta area is urban. It was felt that the energy needs, problems and possible management and conservation approaches would be quite different in the two locations. Results of these programs have provided State energy planners with input and ideas relative to handling energy-related matters in distinctly different environments. The ARC has also studied energy problems and programs as they relate to transportation, and has cooperated with the Georgia Institute of Technology in planning and conducting a series of energy seminars which deal with contingency energy planning.

The Federal Government is also involved with energy conversion/conservation within the State of Georgia. Efforts of this nature take place in a variety of agencies. Some of the most significant efforts take place in the following agencies:

1) The Federal Energy Administration operates a regional office in Atlanta. This agency allocates propane and motor gasoline, and gives grants to state energy programs. The agency also assists in developing and converting to new power sources, and currently employs 164 people.*

2) The Energy Research and Development Administration (ERDA) operates a field office in Atlanta. Two employees oversee activities of an ERDA contractor, Bendix Field Engineering Corporation. The Corporation employs six geologists who work out of this ERDA office, the chief function of which is to ascertain the uranium potential in the Southeastern United States.*

3) The Nuclear Regulatory Commission operates a regional office in Atlanta. Activities are concentrated in the areas of inspection and enforcement, as they pertain to the planning, construction, start-up and operation of nuclear power plants. 108 persons are currently employed.*

4) The Community Services Administration regional office in Atlanta allocates funds to States for the development of weatherization projects, and provides relevant training materials. Two persons participate in these activities.

Based upon interviews with officials located in the above-mentioned State and local agencies, it is estimated that in excess of 500 persons in Georgia are involved to some degree in energy conversion/conservation activities in the public sector. This estimate includes personnel from local Community Action Agencies, from regional planning agencies, from State agencies and institutions, and from federal agencies located within the State. State officials indicate that a small number of architectural and engineering firms provide expert services in the field, particularly with regard to energy conservation and efficiency and the development of alternate sources, and Georgia Power Company has become increasingly involved in research and development in these fields.

C. Workforce Projections

The Director of the State Office of Energy Resources anticipates that the staff of twelve will be sufficient through 1978. After this time, future workforce levels will be contingent mainly upon federal policy and funding levels. It is hoped that State funding will not need to be increased appreciably, and that many of the Office's goals can be accomplished with federal grants.

*For more information regarding these agencies, refer to the Region IV report.

Weatherization program activity is expected to increase, as a bill is currently in the U.S. Congress that would triple the authorization for this activity, the funds for which would be channeled thorugh the Community Service Administration. Workforce levels at the federal and state levels would probably not require increases, although stepped-up activities would probably require increased workforce levels for weatherization programs in the community agencies. In addition, the Federal Energy Administration may also provide funds that could be channeled to these same agencies for weatherization programs.

The Federal Energy Administration in Atlanta anticipates that its staffing level will be cut to 133 by the end of 1976. However, increased activity will take place for energy conservation, and approximately three new persons will be required in the Conservation, Environment and Energy Resource Development component to provide increased assistance to state programs, and for implementation of the weatherization program. Projections beyond 1977 are impossible for FEA administrators to make at this time, as FEA is scheduled to terminate on December 31, 1977. The Nuclear Regulatory Commission in Atlanta does not foresee any staffing level changes but its future workforce level is also contingent upon actions and policy decisions by the U.S. Government. No growth in the number of ERDA employees is expected, although the number of Bendix employees is expected to increase from six to ten within the next two years, after which time the workforce is expected to stabilize.

Research and development efforts, too, are highly contingent upon federal funding. The State is exhibiting a greatly increased interest in activities relating to energy conservation and the development of alternate energy sources, and if federal interest and support grows accordingly, it appears that demands will continue to increase for highly skilled experts in the field.

In the private sector, State sources project increasing numbers of architects, engineers and real estate people that will seek to develop demonstration projects through the U.S. Department of Housing and Urban Development.

D. Training and Certification

The Georgia Institute of Technology offers an Energy Engineering Specialty program. This is a multidisciplinary program, leading to a certificate. Courses are offered in the fields of architecture, thermodynamics, mechanical engineering, nuclear engineering and electrical engineering. At the University of Georgia, courses are offered in agricultural engineering relating to energy conversion/conservation as related to agricultural practices.

The State Economic Opportunity Office provides training to local Community Action Agency personnel in weatherization techniques, information and referral, and other areas of involvement carried out under the program. A portion of the training materials is provided by the U.S. Economic Development Administration.

E. Career Potential

Few career opportunities are expected to emerge in State and Federal energy agencies except as a result of turnover, although changes in U.S. energy policies could affect future staffing levels and areas of activity. The scope of involvement in local Community Action Agencies is expected to increase for weatherization programs, as it appears that Federal appropriations will be substantially increased. Opportunities would result mainly for persons such as outreach workers and fiscal officers. It further appears that career opportunities will continue to develop over the next five years for degreed and highly trained engineers, scientists and architects in energy research, product design and development, and building design.

F. Conclusion

Recently the Office of Energy Resources was created in Georgia which coordinates energy-related activities in the State, and develops plans for energy conservation and efficiency, and emergency response. Also involved in energy-related activities in the State are a variety of Federal, State, regional and local agencies as well as institutions of higher learning. The total energy-related workforce in the public sector appears to surpass 500. State and Federal programs are not expected to demonstrate significant growth rates, and workforce levels may in some cases decline. Local agencies, however, are expected to increase their weatherization efforts, and may find needs for workforce increases. Increasing interest is being seen in the State in the development of alternate energy sources, and it appears that efforts in this direction may provide opportunities for highly trained architects, scientists and engineers in educational institutions and in the private sector. The future magnitude of this involvement will be at least partially contingent upon federal funding levels.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Environmental Research Laboratory
Athens, Georgia

U.S. ENVIRONMENTAL PROTECTION AGENCY

Environmental Research Laboratory
Athens, Georgia

A. Introduction

The Environmental Research Laboratory at Athens, Georgia, is one of four laboratories under the office of Air, Land, and Water Use of the Office of Research and Development. These four laboratories are concerned with research and development programs on the transport and fate of pollutants, control of pollution associated with renewable resources and public sector activities, and the development of monitoring techniques and equipment.

According to a descriptive brochure provided by the director of the facility, Dr. David W. Duttweiler, the facility's missions and functions are as follows:

> The Athens Laboratory plans and conducts research and development on the identification and measurement of environmental pollutants, pollutant transport and fate in water and soil, control of pollutants from agricultural or silvacultural non-point sources, and environmental management methods to achieve water quality goals. The focus of this research is on specific pollutants, especially pesticides and other toxicants, and on the environmental pathways of these substances. Following an approach developed over a dozen years of experience, research on environmental pathways examines processes individually and collectively (as systems), in both laboratory and field experiments to elucidate more accurately the real-world environmental phenomena that link sources of pollutants to human or other biological receptor exposures.

Besides in-house research activities that are conducted, the Laboratory awards grants and contracts for extramural research. During Fiscal Year 1976, awards went to 26 educational institutions, as well as to several private and governmental research organizations, on a wide variety of topics. The Laboratory also furnishes technical assistance to other pollution control professionals in EPA and state and local governments, and in the international scientific community.

B. Workforce Profile

The technical work of the Laboratory is conducted primarily by four branches, which are assisted by an administration and support branch. Two associate directors provide expert consulting and help integrate the research and attune it to the needs of EPA's regulatory offices. The branches and abbreviated functions are as follows:

> Analytical Chemistry Branch: Identifying and measuring organic pollutants in low concentrations of drinking water, in wastewaters and in rivers and lakes is carried out through the use of a complex analytical system. A computerized register of all organic compounds found in water is being developed.
>
> Environmental Processes Branch: Defining the individual microbiological, chemical and physical-chemical processes that control the transport, transformation, and impacts of pollutants in soil and water is carried out. Kinetics studies of processes are performed for gaining insight into pollutant behavior, and quantitative methods are developed for determining and predicting the effects of environmental factors on process kinetics.
>
> Environmental Systems Branch: Research in this Branch conceives, constructs, tests and verifies models of the environmental transport, transformation, degradation, and impact of pollutants or other materials in soil and water. Physical simulation and numerical simulation are combined.
>
> Technology Development and Applications Branch: The Branch focuses on the development and demonstration of economically feasible technologies for the prevention and control of adverse environmental effects caused by non-irrigated agriculture and silvaculture, and the development of methods for comprehensive environmental management to achieve water quality goals.

A staff of 74 full-time permanent employees is employed within the laboratory itself. This staff is complemented by 29 "physical science technicians", who are students that temporarily work at the lab on a part-time basis. The following table depicts current workforce levels for permanent full-time employees at the Laboratory:

TABLE XXI
U.S. ENVIRONMENTAL PROTECTION AGENCY
Environmental Research Laboratory, Athens, Georgia
Current (1976) Staffing Level

Position	1976
Administrator	3
Engineer	6
Chemist	29
Soil Scientist	3
Biologist	3
Microbiologist	3
Lab Technician	2
Engineering Technician	4
Other*	24
TOTAL	74

* Includes clerical, ADP, administrative support and equipment maintenance personnel

Recruitment is conducted through standard Civil Service Commission procedures. All positions except engineers are easily found through this procedure.

C. Workforce Projections

Dr. Duttweiler, the director of the Laboratory, has indicated that EPA has projected that 85 permanent full-time persons will be employed at the Laboratory in five years' time. However, it is emphasized that this figure does not represent plans as such, but rather forecasts. No growth could occur, or a larger growth than is predicted.

If these eleven people were added, their efforts would be used to supplement existing activities, as it is felt that the Laboratory is currently understaffed for current projects. Positions sought would be in presently-staffed technical areas, although larger increases might occur for engineers and technicians.

The following table depicts approximations of future workforce levels in the Laboratory based upon the best professional judgments of EPA administrators:

TABLE XXII
U.S. ENVIRONMENTAL PROTECTION AGENCY
Environmental Research Laboratory, Athens, Georgia
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administrator	3	3	3	3	3	3	5%	0%
Engineer	6	6	7	9	9	9	5%	9%
Scientist	38	38	39	40	40	41	5%	2%
Technician	6	6	7	8	8	9	5%	9%
Other	21	21	22	22	23	23	5%	2%
TOTAL	74	74	78	82	83	85		3%

The number of part-time students not included above, does not vary significantly from year-to-year. This type of employee, because of the temporary nature of the job, demonstrates a much higher level of turnover.

If the future workforce is increased significantly, above the projected levels to a point that the technical programs are adequately staffed, administrators of the Laboratory would like to expand into a new area that would require new disciplines on the staff. While much of the current research deals with managing the environment to achieve water quality goals, social scientists and economists would be recruited to analyze the feasibility of systems that are developed in terms of cost and the ability of governments to use the plans as developed.

D. Training and Certification

Employees in the Laboratory have available several alternatives for the upgrading of skills. Civil Service Commission courses are brought to Athens, in which employees can learn management, administrative and secretarial skills. Short courses offered by universities in the vicinity, such as the University of Georgia, are also utilized when available. Employees are also sponsored to attend college part-time to upgrade their skills. For instance, technicians are sent to schools, and as a result may be upgraded from a technical to a professional position. The Laboratory, however, cannot sponsor any employee to attend a college or university on a full-time basis.

In the training to employees that is offered, ancillary skills are emphasized, such as reading, management, writing, instrumentation techniques and grantwriting. These are seen as a great benefit to employees by Laboratory administrators because employees too often lack these types of skills. Limits, however, are placed upon the opportunities availability to employees by the travel ceiling placed upon the Laboratory. The greatest hardship resulting from this travel ceiling is that few employees are able to attend professional society meetings, which are important for learning new developments in the field. Specialized short courses offered by universities outside the State also are rarely attended.

E. Career Potential

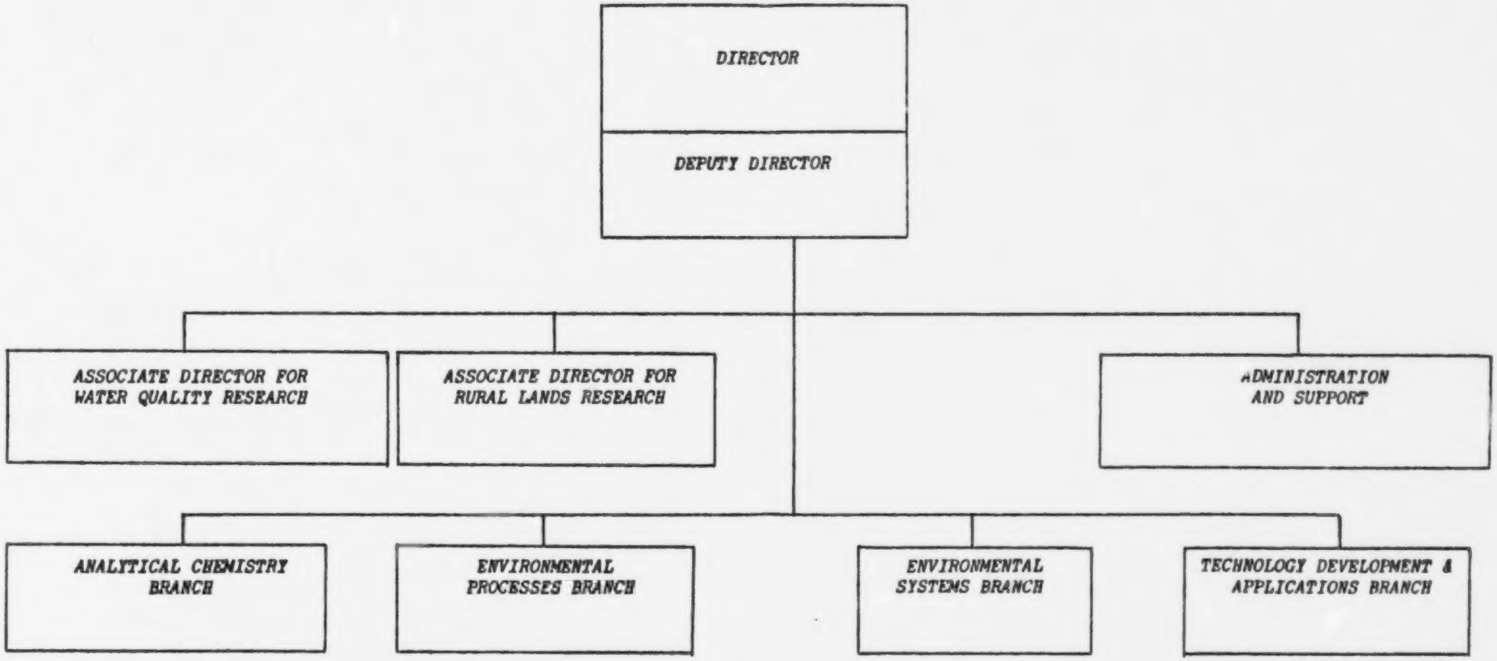
Growth in the Environmental Research Laboratory is not expected to be dramatic in the next five year. New positions that are authorized will be filled mainly by engineers, scientists and technicians. If workforce growth is larger than projected, to a point that present ongoing programs are adequately staffed, opportunities may exist for social scientists and economists.

F. Conclusion

Administrators in the Environmental Research Laboratory and at EPA Headquarters estimate that 85 persons will be employed in the Environmental Research Laboratory by 1982. This represents 11 new positions over the current total of 74 full-time permanent employees. Part-time assistance from students will continue to be utilized in the future. It is further projected that future activities will not deviate substantially from present activities, although administrators would like to expand projects to include social implications of the research that is conducted. The current budget does not allow for this activity, and it is doubtful that this will be included within the next five years.

Figure 6

U. S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH & DEVELOPMENT
ENVIRONMENTAL RESEARCH LABORATORY
ATHENS, GEORGIA 30601


DIRECTOR
DEPUTY DIRECTOR
ASSOCIATE DIRECTOR FOR WATER QUALITY RESEARCH
ASSOCIATE DIRECTOR FOR RURAL LANDS RESEARCH
ADMINISTRATION AND SUPPORT
ANALYTICAL CHEMISTRY BRANCH
ENVIRONMENTAL PROCESSES BRANCH
ENVIRONMENTAL SYSTEMS BRANCH
TECHNOLOGY DEVELOPMENT & APPLICATIONS BRANCH

19 August 1976

Selected Post Secondary Institutions With Formal Environmental Energy Programs

On the following pages are descriptions of the environmental curricula available at The Georgia Institute of Technology and West Georgia College. Both institutions prepare students for a number of environmental service capabilities. The Georgia Institute of Technology provides six engineering specialties or degrees on B.S., M.S., and Ph.D. levels directly applicable to the environmental field while West Georgia College offers a non-degreed Community Education Program with emphasis in environmental technology.

Also in the state, environmental curricula are available at Southern Technical Institute, a division of the Georgia Institute of Technology, and Georgia Military College. Southern Technical Institute offers Associate and Bachelor degrees in Civil Engineering and an Associate degree in Electrical Engineering Technology with a Nuclear Safety Option. In the former program, course study includes Municipal Sanitation and Hydraulics, Environmental Sanitation, Water Treatment Systems, Waste Treatment Systems and Urban Drainage and Erosion Control. The latter program with the Nuclear Safety Option includes study in Control of Environmental Systems, Peaceful uses of Nuclear Energy, Introduction to Nuclear Radiation and Applied Health Physics.

Georgia Military College offers an Associate Degree in Engineering with an optional concentration in Environmental Health. This course study includes Health and Environmental Engineering, Environmental Chemistry, and Water, Waste, and Sewage Treatment.

The University of Georgia in Athens is the state's chief agricultural school. Within the College of Agriculture, a program of study in environmental health science is available,as well as a concentration in pest management.

Georgia College offers associate, bachelor, and master's degrees in environmental science in which students may specialize in water quality, air quality or a mixture of both areas. Middle Georgia College offers an associate degree curriculum in environmental technology with courses in the areas of water, air, solid waste, conservation and ecology.

This information was provided by professionals at the institutions as well as literature published by the colleges and universities.

SENIOR INSTITUTIONS

Georgia Institute of Technology
Atlanta, Georgia

Program: Civil Engineering (B.C.Engr., B.S., M.S.C.Engr., M.S.San.Engr., M.S., Ph.D.)

Hours required of degree: (Undergraduate) 209 quarter hours; 68 hours in major
Program Inception: 1896
Staff Size: Director, four professors emeriti, two regent's professors, eleven professors, fifteen associate professors, ten assistant professors. See also*, Staff Size
Enrollment: 867 Civil Engineering
33 Sanitary Engineering

Graduates:	(1976) Civil Engineering	Sanitary Engineering
	166 Bachelors	9 Masters
	54 Masters	
	4 Ph.D.'s	

Placement: Note*
Graduate Work: Note*

Courses (Undergraduate)

Introduction to Civil Engineering
Plane Surveying
Civil Engineering Applications of Digital Computers
Elementary Surveying
Fluid Mechanics I
Fluid Mechanics II
Fluid Mechanics Laboratory
Structural Analysis I
Advanced Surveying I
Materials of Construction
Structural Analysis
Construction
Applied Hydraulics
Sanitary Engineering I, II, III
Engineering Aspects of Environmental Health
Man in His Environment
Physical Behavior of Soil and Rock
Soil and Rock Engineering
Metal Structural Components
Structural Analysis II
Concrete Structural Components
Structural Design
Design in Timber and Prestressed Concrete
Elementary Aerial Photogrammetry
Engineering Astronomy
Advanced Surveying II

Advanced Route Surveying
Transportation Engineering I
Transportation Engineering II
Hydrology
Applied Hydrology
Water Resources Development
Groundwater Hydrology
Reinforced Concrete Design I, II
Application of Microbiology in Sanitary Engineering
Special Topics
Special Topics
Special Problems

Courses (Graduate) 50 hours required

Construction Administration
Civil Engineering Management I,II
Steady Flow in Open Channels I,II
Civil Engineering Management II
Intermediate Fluid Mechanics
Advanced Topics in Hydromechanics
Transient Flow in Enclosed Conduits
Engineering Hydrodynamics
Sedimentation and Sediment Transport
Gravity-wave Phenomena
Mechanics of Flow in Porous Media
Aquatic Chemistry
Sanitary Engineering Design I
Application of Instrumental Analysis in Sanitary Engineering
Industrial Wastes Treatment and Disposal
Sanitary Engineering Design II
Solid Waste Technology I, II
Stream Analysis
Air Pollution Measurements and Control
Basic Radiological Health
Applied Limnology
Applications of Chemistry in Sanitary Engineering
Sanitary Engineering Processes I, II
Field Methods in Sanitary Engineering
Advanced Microbiology of Water and Wastes
Dock, Harbor and Shore Structures
Advanced Soil Mechanics
Rock Mechanics
Physical and Physiochemical Properties of Soils
Advanced Foundation Engineering
Soil Testing
Terrain Evaluation and Applications
Dynamic Characteristics of Soils
Soil Construction
Dynamics of Massive Media

Theoretical and Applied Soil Mechanics I, II
Structural Planning
Reinforced Concrete Structures I, II
Experimental Analysis I
Indeterminate Structural Theory I
Matrix Methods of Structural Dynamics
Principles of Matrix Structural Analysis
Advanced Structural Mechanics
Finite Element Method of Structural Analysis
Plastic Design in Steel
Structural Dynamics
Reinforced Concrete Structures III
Advanced Aerial Photogrammetry
Geodetic Engineering
Legal Principles of Land Surveying
Pavement Design
Concrete Technology
Airport Planning and Design
Asphalt Technology
Transportation Administration
Mass Transit Planning
Traffic Engineering
Advanced Traffic Operations
Design of Highways and Transit Facilities
Urban Transportation Planning
Theory of Traffic Flow
Economic and Financial Aspects of Public Works Planning
Issues in Water Resources Planning and Management
Economics of Water Resources Development
Applied Environmental Resources Management
Flood Management
Watershed Analysis
Hydrologic Models
Hydrologic Simulation
Urban Hydrology
Hydrology of Floods
Water Resources Systems Engineering
Locational Analysis
Urban Sanitary Facilities
Urban Transportation Facilities and Policies
Complex Systems Design
Advanced Computer Interfacing and Design
Computer Control of Real-Time Systems
Advanced Engineering Programming Methods
Environmental Radiation Surveillance
Master's Thesis
Doctoral Examinations Preparations
Seminar in Sanitary Engineering
Seminar in Environmental Resources Problems I and II
Seminar in Soil and Rock Mechanics
Seminar in Foundation Engineering

Seminar in Transportation Engineering
Construction Seminar
Special Topics
Special Topics
Special Problems
Master's Special Research Problem
Doctoral Thesis Preparation
Doctoral Thesis

Program: Nuclear Engineering (B.N.E., M.S.N.E., M.S., M.A.N.S., Ph.D.)

Hours required of degree: (Undergraduate) 206 quarter hours

Program Inception: 1962
Staff Size: Director, one neely professor, seven professors, five associate professors, two assistant professors, one adjunct assistant professor. See *Staff Size
Enrollment: 281
Graduates: (1976) 16 Bachelors
26 Masters
6 Ph.D.'s
Placement: Note*
Graduate Work: Note*

Courses (Undergraduate)

Energy and Engineers in Society
Introduction to Health Physics
Nuclear Radiation Detection
Nuclear Engineering Seminar
Nuclear Engineering Calculations with Digital Computers I
Nuclear Reactor Physics I, II
Reactor Laboratory
Reactor Operations
Reactor Engineering I, II
Nuclear Engineering Design
Radiation Transport and Shielding
Boiling Water Reactor Systems and Operations
Health Physics Seminar
Radiation Physics
Principles of Health Physics
Applied Health Physics
Effects of Non-Ionizing Radiation and Protection Standards
Nuclear Technology and the Environment
Isotopic Tracer Methodology
Nuclear Reactor Engineering I, II, III
Elements of Nuclear Engineering
Energy Conversion Engineering
Special Topics
Special Problems

Courses (Graduate)

Introduction to Nuclear Materials
Nuclear Fuel Elements
Nuclear Reactor Analysis I, II
Radiation Detection I
Advanced Radiation Detection
Radiation Effects on Materials
Nuclear Engineering Calculations with Digital Computers II
Monte Carlo Methods in Nuclear Engineering
Advanced Nuclear Reactor Physics I,II
Nuclear Engineering Laboratory
Nuclear Reactor Technology I, II
Advanced Engineering Design
Applied Reactor Theory
Reactor Kinetics and Control
Nuclear Fuel Management
Nuclear Reactor Safety
Fast Reactor Physics and Technology
Fundamentals of Nuclear Engineering
Radiation Attenuation
Radiological Health Physics
Health Physics Practice
Radiation Dosimetry
Applied Radiation Physics
Radiation Dosimetry Systems
Radiation Technology Laboratory
Particle Accelators
Radiation Protection in Nuclear Facilities
Applied Health Physics Laboratory
Radioisotopes Engineering I, II
Thermonuclear Engineering I, II
Environmental Surveillance and Radioactive Waste Disposal
Environmental Impact of Nuclear Power Stations
Advanced Energy Conversion I, II
Financial Management and Economics of Nuclear Power
Small Computer Interface Engineering and Applications
Engineering Computer Software Systems
Advanced Computer Interfacing and Digital Design
Computer Control of Real-Time Systems
Environmental Surveillance and Radioactive Waste Disposal
Master's Thesis
Preparation for Doctoral Qualifying Examination
Seminar
Special Topics
Special Problems
Doctoral Dissertation Preparation
Doctoral Dissertation

Program: Multidisciplinary Programs in Engineering leading to certificates in Acoustical Engineering (M., Ph.D. levels), Energy Engineering (B., M., Ph.D. levels), and Environmental Studies (M., Ph.D. levels)

Hours required: Acoustical Engineering Certificate (Graduate)

1. 5 or more courses from an approved list of courses
2. inclusion of a course from a choice of departments in Acoustics
3. inclusion of 4 courses at the 6000 level or above

Energy Engineering Certificate (Undergraduate)

1. 3 specific courses in architecture or the equivalent courses offered under Philosophy and History of Science (9 credit hours)
2. 4 credit hours in thermodynamics
3. 6 credit hours from a list of approved courses

Energy Engineering Certificate (Graduate)

1. 21 credit hours of course work at the 6000 level or higher selected from an approved list of courses
2. inclusion of 3 credit hours in each of these areas: thermodynamics, heat transfer, fluid flow, control systems, energy systems
3. 6 credit hours of either more advanced work in the above areas or a selection of approved courses
4. formal instruction in aspects of research and development
5. 6 credit hours of special problem work or 17 hours of thesis work

Environmental Studies (Graduate)

1. 24 credit hours in approved course work
2. 6 credit hours in special problem or thesis work Graduate courses are selected from the 6000 level or above.

Program Inception: varies (1974-1975)

Staff Size: Staff size is unlimited since courses are taught by faculty in a variety of departments and disciplines. According to sources at Georgia Institute of Technology, full or associate professors are selected to teach in the multidisciplinary programs since the courses require extensive knowledge. See *Staff Size

Enrollment: Officials at the Institute have difficulty ascertaining enrollment figures since students are not required to apply for a certificate until their final term.

Graduates: (1976) Acoustical Engineering Certificate
4 on the master's level
1 on the Ph. D. level
Energy Engineering Certificate
0 on any level
Environmental Engineering Certificate
4 on the master's level

Placement: Note*
Graduate Work: Note*

Courses (Undergraduate and Graduate)

Students who select their elective courses carefully may qualify for a certificate in a multidisciplinary program. Committees of faculty members develop guidelines geared to the Engineer's Council for Professional Development standards for the multidisciplinary areas. Students are advised on an individual basis as to appropriate courses that satisfy the requirements of the certificate programs.

The following table outlines the Multidisciplinary Program Pattern, depicting current available areas, degree levels, and which departments have established programs or programs in the planning stage. Differing asterisk sizes are irrelevant.

*Staff Size: Sources at Georgia Institute of Technology stated that 90% of the total faculty hold doctorate degrees. Approximately 36% of the staff are registered professional engineers and, therefore, have working experience.

*Placement and Graduate Work: Sources at Georgia Institute of Technology stated that 1300 students took advantage of the placement services offered. Eighty percent of those students were employed before graduation. Within three months of graduation all of the students were placed.

Sources also estimated that on the average, each undergraduate student receives three or four employment offers.

Students who do not utilize the placement office often extend their education into graduate studies.

Figure 7

Multidisciplinary Programs

GEORGIA INSTITUTE OF TECHNOLOGY

Multidisciplinary Program Pattern

Multidisciplinary Program Area	Related Degree Levels			Aerospace Engineering	Ceramic Engineering	Chemical Engineering	Civil Engineering	Electrical Engineering	Engineering Science & Mechanics	Health Systems	Industrial and Systems Engineering	Mechanical Engineering	Nuclear Engineering	Textile Engineering	Architecture	Biology	Chemistry	Information & Computer Science	Physics	Psychology
Acoustical Engineering		M	PhD	X			•	X	X		X	X		X	X				*	•
Bioengineering	B	M	PhD	X		X		X	X	•	X	X		X	*	*				
Computer Engineering		M	PhD	X	•	X	X	X	•	•	X	X	X	•	•			•		
Educational Engineering	B							*	*	•	*	*		•						
Energy Engineering	B	M	PhD	X	X	•	•	X	X		X	X	X		X					
Engineering Design	B	M	PhD	•		•	•	•	•		•	•	•		•					
Environmental Studies		M	PhD	X		X	X	X	X		X	X	X	•	•	•	•		•	
Manufacturing Systems	B					•		•			•	•		*	*					
Materials Engineering	B			X	X	X	X	X	X		X	X	X	X	X		*			
Mineral Engineering		M	PhD		X	X	X													
Ocean Engineering	B	M	PhD	•		•	•		•			•			•					
Plastics Engineering	B	M	PhD	•	X	X	•		•			X		X	•					
Pulp and Paper Engineering	B				X	X						X		X	X		*			
Structures Engineering		M	PhD	X			X		X			•		•	•					
Systems Engineering		M	PhD	•			•	•		•	•	•		*	•					
Transportation Engineering		M	PhD	X			X	X	X		X	X			*					
Urban Engineering	B						X	X	X	X	X	X			X					

X = Established Programs   • = Programs in Planning Stage

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

West Georgia College
Carrollton, Georgia

Program: Community Education Programs with emphasis in environmental technology

Hours required of degree: Non-degree programs; offered on an individual basis.

Program Inception: varied
Staff Size: 2 instructors (2 B.S.)

Courses

Basic Waste Water for Class III and IV plants
Hours Required: 2.4 C.E.U.
Enrollment: 150
Graduates: 150
Placement: 150 (all on the job trainees)
Graduate Work: 0

Advanced Wastewater for Class I and II plants
Hours Required: 1.8 C.E.U.
Enrollment: 100
Graduates: 100
Placement: 100 (all on the job trainees)
Graduate Work: 0

Basic Surface Water Treatment
Hours Required: 1.8 C.E.U.
Enrollment: 100
Graduates: 100
Placement: 100 (all on the job trainees)

Advanced Surface Water Treatment
Hours Required: 1.2 C.E.U.
Enrollment: 50
Graduates: 50
Placement: 50 (all on the job trainees)

Basic Ground Water Treatment
Hours Required: 1.8 C.E.U.
Enrollment: 100
Graduates: 100
Placement: 100 (all on the job trainees)

Advanced Ground Water Treatment
Hours Required: 1.2 C.E.U.
Enrollment: 10
Graduates: 10
Placement: 10 (all on the job trainees)

Water Distribution Certification Program
Hours Rquired: 1.8 C.E.U.
Enrollment: 30
Graduates: 30
Placement: 30 (all on the job trainees)

Laboratory - Basic Skills Orientation
Hours Required: 1.8 C.E.U.
Enrollment: 15
Graduates: 15
Placement: 15 (all on the job trainees)

Wastewater Laboratory
Hours Required: 2.4 C.E.U.
Enrollment: 20
Graduates: 20
Placement: 20 (all on the job trainees)

Water Laboratory
Hours Required: 1.8 C.E.U.
Enrollment: 20
Graduates: 20
Placement: 20 (all on the job trainees)

Package Aeration Plant:
Hours Required: 1.8 C.E.U.
Enrollment: 25
Graduates: 25
Placement: 25 (all on the job trainees)

Activated Sludge Workshops
Hours Required: 1.8 C.E.U.
Enrollment: 40
Graduates: 40
Placement: 40 (all on the job trainees)

Trickling Filter
Hours Required: 1.8 C.E.U.
Enrollment: 8
Graduates: 8
Placement: 8 (all on the job trainees)

State Legislation

GEORGIA AIR

TITLE:

Air Quality Control Act
Georgia Code 88-9

PURPOSE:

To preserve, protect and improve air quality of the state to safeguard public health.

DEFINITIONS:

1. Air contaminant
2. Air pollution
3. Source
4. Air-cleaning device
5. Area of the state
6. Department
7. Person
8. Board

ADMINISTERING AUTHORITY:

Department of Public Health
Board of Health
Department of Natural Resources

AUTHORIZATIONS:

To issue regulations relating to air quality standards, monitoring devices, and air pollution control;
To issue permits regarding potential injurious air pollution;
To develop comprehensive air pollution program;
To conduct studies and investigations of air pollution;
To generally enforce the act.

PROHIBITED ACTS:

To emit air contaminants which violate air quality standards;
To violate the conditions of any permit.

EXEMPTIONS:

Forest land operations; totally in-plant air conditions.

PENALTIES:

Criminal - violations constitute misdemeanor;
Civil - fines of up to $1,000 plus $500 per day.

GEORGIA PESTICIDES

TITLE:

Pesticide Use and Application Act
Georgia Code 5-1501A

PURPOSE:

To regulate, in the public interest, the use and application of pesticides.

DEFINITIONS:

1. Animal
2. Beneficial insects
3. Board
4. Certified applicator
5. Private applicator
6. Commercial applicator
7. Pesticide contractor
8. Commissioner
9. Defoliant
10. Desiccant
11. Environment
12. EPA
13. Equipment
14. FIFRA
15. Fungi
16. Insect
17. Label
18. Labeling
19. Land
20. Nematode
21. Permit
22. Person
23. Pest
24. Pesticide
25. Plant regulator
26. Protect health and Environment
27. Restricted use pesticide
28. State restricted use pesticide
29. Under direct supervision of certified public applicator
30. Unreasonable adverse effect on environment
31. Weed
32. Wildlife

ADMINISTERING AUTHORITY:

Department of Agriculture
Pesticide Advisory Board

AUTHORIZATIONS:

- To issue regulations regarding pesticide use and classification;
- To establish certification categories and qualifications;
- To certify pesticide applicators;
- To control pesticide use and container disposal;
- To enforce the act generally.

CERTIFICATION OR LICENSING:

All private and commercial pesticide applicators and contractors must be certified; qualifications shall be demonstrated; categories established.

PROHIBITED ACTS:

- To engage in pesticide application without proper certificate;
- To violate the conditions of a permit or be negligent in pesticide use;
- To store or dispose of pesticides or containers as to harm the environment.

EXEMPTIONS:

Farmers, veterinarians, experimental research activities, structural pest operators.

PENALTIES:

Violation constitutes misdemeanor.

GEORGIA POTABLE WATER

TITLE:

Water Supply Quality Control Act
Georgia Code 88-2601

PURPOSE:

To establish and maintain a water quality program for water supplies of the state.

DEFINITIONS:

1. Department
2. Board
3. Director
4. Waters
5. Person

ADMINISTERING AUTHORITY:

Department of Public Health
Board of Health

AUTHORIZATIONS:

To establish water supply quality standards;
To control the source, distribution, purification and treatment of water supplies;
To conduct studies regarding public water supplies;
To issue certificates for operation of water supply systems;
To issue regulations pursuant to the act;
To issue emergency orders.

PROHIBITED ACTS:

To construct or operate any public water supply system without prior approval regarding source, treatment and operation.

PENALTIES:

Civil - fines of up to $1,000 plus $500 per day;
Criminal - violation constitutes misdeameanor.

GEORGIA RADIATION

TITLE:

Radiation Control Act
Georgia Code 88-1301

PURPOSE:

To prevent public harm from ionizing radiation and to promote the responsible uses of sources of ionizing radiation.

DEFINITIONS:

1. Ionizing radiation
2. Radiation machine
3. Radioactive material
4. Permissible ionizing radiation exposure
5. Person
6. Department
7. General license
8. Specific license
9. By-product material
10. Source material
11. Special nuclear material
12. Radiation

ADMINISTERING AUTHORITY:

Department of Natural Resources
Division of Environmental Protection

AUTHORIZATIONS:

To develop radiation hazard policies;
To conduct studies relating to control of radiation sources;
To issue regulations pursuant to the act;
To require licensing and registration of radioactive material and radiation machines;
To approve plans for radiation shielding and disposal construction;
To enter into agreements with state and federal agencies;

AUTHORIZATIONS (Cont'd):

To issue general and specific licenses for the use, manufacture and transportation of nuclear materials;
To enter and inspect property in enforcement of the act;
To impound radiation sources in emergencies.

PROHIBITED ACTS:

To use, manufacture, produce or possess any sources of radiation not licensed or registered;
To construct or operate radioactive waste storage or disposal site without permit.

EXEMPTIONS:

May be established by regulation.

PENALTIES:

Violation constitutes a misdemeanor.

NRC AGREEMENT STATE: Yes

GEORGIA SOLID WASTE

TITLE:

Solid Waste Management Act
Georgia Code

PURPOSE:

To provide for comprehensive solid waste management and to protect the environment from the adverse effects of solid waste.

DEFINITIONS:

1. Person
2. Director
3. Solid Waste
4. Solid waste handling
5. Disposal facility
6. Disposal site
7. Nuisance

ADMINISTERING AUTHORITY:

Department of Natural Resources

AUTHORIZATIONS:

To issue regulations regarding solid waste handling and disposal;
To assist local agencies in solid waste matters;
To act as the state lead agency in solid waste matters;
To review and approve local solid waste plans and issue permits therefor.

PROHIBITED ACTS:

To violate the act or cause pollution in solid waste handling or disposal;
To construct or operate facility without a permit.

EXEMPTIONS:

Limited livestock facility operations;
Manure use as fertilizer;
Disposal of personal solid waste on own land.

PENALTIES:

Civil fines of up to $1,000 and $500 per day;
Criminal - violation constitutes misdemeanor.

GEORGIA WASTE WATER

TITLE:

Water Quality Control Act
Georgia Code

PURPOSE:

To restore and maintain the water quality of the state for maximum utilization by the people.

DEFINITIONS:

1. Department
2. Division
3. Board
4. Waters
5. Person
6. Pollution
7. Sewage
8. Industrial wastes
9. Sewage system
10. Effluent limitation
11. Pollutant
12. Point source
13. Non-point source

ADMINISTERING AUTHORITY:

Department of Public Health
Water Quality Control Board
Department of Natural Resources

AUTHORIZATIONS:

To study methods of and cooperate with other agencies in controlling pollution;
To act to maintain purity in waters of state;
To develop a comprehensive plan of water pollution control;
To establish water quality standards;
To establish effluent limitations and issue permits therefor;
To issue regulations pursuant to the act;
To act as the state lead agency in water pollution matters.

PROHIBITED ACTS:

To discharge wastes into state waters contrary to water quality standards;
To construct or modify sewage disposal facilities without a permit;
To violate the terms of any point or non-point discharge permit.

PENALTIES:

Civil liability imposed for any damages caused;
First offense - fines of from $2,500 to $25,000 or one year imprisonment;
Subsequent offenses - fines of up to $50,000 or two years imprisonment;
False information violations - fines of up to $10,000 or six months imprisonment.

GEORGIA WASTE WATER

TITLE:

Certification of Water and Waste Water
Treatment Plant Operators Act
Georgia Code 84-5201

PURPOSE:

To provide for the classification of all water supply systems and waste water treatment plants, and for the certification of operators of such facilities.

DEFINITIONS:

1. Board
2. Certificate
3. Public water supply system
4. Water treatment plant
5. Waste water treatment plant
6. Operator

ADMINISTERING AUTHORITY:

State Board of Examiners for Certified Water and Waste Water Treatment Plant Operators

AUTHORIZATIONS:

To classify all public water supply and waste water treatment facilities;
To establish standards for operators of such facilities;
To examine operators and issue certificates.

CERTIFICATION OR LICENSING:

All public water supply and waste water treatment plant operators must demonstrate competence and be certified according to facility classification.
Prior operators certified without examination.

PROHIBITED ACTS:

To perform duties of operator without proper certification;
To operate any facility without a properly certified operator.

PENALTIES:

Violations constitute misdemeanor.

GEORGIA ENERGY

TITLE:

Council for Energy Resources Act
Georgia Code

PURPOSE:

To provide for energy conservation and efficiency, to ensure wise management of energy resources and adequate energy supply for the state.

DEFINITIONS:

ADMINISTERING AUTHORITY:

Council for Energy Resources
Office of Energy Resources

AUTHORIZATIONS:

To evaluate and assess energy policies;
To encourage inter-agency cooperation under the act;
To issue regulations pursuant to the act;
To administer federal energy funds and grants;
To conduct studies and investigations regarding energy;
To develop a comprehensive state energy program.